Journal of Transportation Management

Volume 12 | Issue 1 Article 9

4-1-2000

Full Issue

Journal of Transportation Management Editors

Journal of Transportation Management

Vol 12 No 1
Spring 2000

Delta Nu Alpha Transportation Fraternity

Journal of Transportation Management

Vol 12 No 1
Spring 2000

Published by
Delta Nu Alpha Transportation Fraternity
and
Georgia Southern University

Journal of Transportation Management

Editorial Review Board

DELTA NU ALPHA

2000-2001 Officers

President
Jeff Wilmarth
Silver Arrow, Inc.

Vice-President/Secretary–Treasurer

Bruce Rysdyk
Bil-Mar Foods

Foundation Liaison

Michael Pughes
Carquest, Inc.

Directors

Cathy Davis
MCD Transportation, Inc.

Patrick O'Connell
Menlo Logistics

Kathryn Dobie
North Carolina A&T State University

Kurt Koenig
Wisconsin Paper Company

Dr. Jerry W. Wilson
Georgia Southern University

Mailing Address:
Post Office Box 1569
Rockford, IL 61110

Membership Information:

Silver Membership	$75.00	Annually
Gold Membership	$125.00	Annually

Applications and Information: (800) 453-3662.
or
www.deltanualpha.org


Georgia Southern University
Southern Center for
Logistics & Intermodal Transportation

From the Editor...

Welcome to the Spring 2000 issue of the *Journal of Transportation Management*. No, the date is not incorrect. Since becoming editor, I have managed to publish two issues per year—without skipping an issue. However, I have been unable to close the gap between the issue date and the date of printing/mailing. The problem stems primarily from the small number of quality articles submitted for review. This issue is difficult for an editor to address in the short run. With your help, I can close the time gap. Please encourage your colleagues to submit quality articles to me for publication consideration. A substantial increase in the number of articles submitted would quickly allow me to close this time gap. Remember, the *Journal* is published as a service to the industry and not for-profit. I have no promotion budget!

You may have noticed the changes in staff for this issue. Brian Gibson [Auburn University], my original associate editor, has decided to relinquish the position and become a member of the Editorial Review Board. He will be replacing Jim Adams, who retired from Auburn after serving on the Board for many years. Jim was a valuable asset and will be missed. I'm sure Brian will continue to be a valuable asset for the *JTM*. Steve Rutner has assumed the duties of Senior Associate Editor and will play a significant role in shaping future policy. Finally, our two newest additions to the Logistics faculty here at Georgia Southern, Karl Manrodt and Hong Min, have agreed to join the team as Associate Editors. I welcome their expertise and enthusiasm.

As always, I am indebted to the authors for their patience, quality of research and writing, and for thinking of the *JTM* as an outlet for their work. I offer my sincere gratitude to the members of the Editorial Review Board who contributed to the success of this and every issue. Remember that the reviewers are volunteers—they agree to give their time and expertise and ask for nothing in return. I could not do my job without them.

The lead article in this issue, by Robert Cook and Brian Gibson, reports the results of a study they conducted on management development and retention strategies among third-party logistics firms. They suggest that efforts to improve human resource programs, particularly for junior managers, should focus on improving orientation programs, mentoring, job enrichment, formal career planning, the relocation process, educational support, and training and compensation. The second article, by Joe Hanna and William Compton, is also empirically-based and examines the state of logistics education in the United States. The second phase of the research utilizes the Delphi technique, through the Internet, to determine the future direction of logistics education. Kathleen Gruben, Cathy Owens Swift, and Trey Denton discuss their efforts in assessing the availability of previously written and written-to-order term papers in the area of logistics and transportation in the third article. They also suggest some innovative strategies that can be used by logistics faculty to curb the use of such services by their students. Stephen Parker, John Kent, and Karl Manrodt take a close look at mobile communication systems in the trucking industry in the fourth article of this issue. An interesting result of their

survey of over 500 trucking firms is that only 68 percent of the respondents report having a mobile communication system in their company. In the final article of this issue, Kathryn Dobie, Milt Glisson, and Jim Grant explore a seldom-mentioned aspect of international logistics operations—the impact of terrorism. They also offer suggestions on identifying supply chain linkages that are most vulnerable to terrorist activity and how to strengthen these linkages. I hope that you take the time to read each of the articles in this issue. I think you will be glad that you did.

In closing, remember that we cannot survive and continue to publish without reader support. Please join or renew your membership in Delta Nu Alpha International Transportation Fraternity and subscribe to the *Journal of Transportation Management.* Share this issue with a colleague and encourage him/her to subscribe today!

Jerry W. Wilson, Editor
Journal of Transportation Management
Southern Center for Logistics and Intermodal Transportation
Georgia Southern University
P.O. Box 8154
Statesboro, GA 30460-8154
(912) 681-0257 (912) 871-1523 FAX
jwwilson@gsaix2.cc.gasou.edu

Stephen M. Rutner, Senior Associate Editor
(912) 681-0588
srutner@gsaix2.cc.gasou.edu

Karl Manrodt, Associate Editor
(912) 681-5931
kmanrodt@gsaix2.cc.gasou.edu

Soonhong Min, Associate Editor
(912) 871-1838
smin@gsaix2.cc.gasou.edu

And visit our web sites:

Delta Nu Alpha Transportation Fraternity: www.deltanualpha.org
Georgia Southern University Logistics: www2.gasou.edu/coba/centers/lit

Journal of Transportation Management

OBJECTIVES

Editorial Policy. The primary purpose of the *JTM* is to serve as a channel for the dissemination of information relevant to the management of transportation and logistics activities in any and all types of organizations. Articles accepted for publication will be of interest to both academicians and practitioners and will specifically address the managerial implications of the subject matter. Articles that are strictly theoretical in nature, with no direct application to the management of transportation and logistics activities, would be inappropriate for the *JTM*.

Acceptable topics for submission include, but are not limited to carrier management, modal and intermodal transportation, international transportation issues, transportation safety, marketing of transportation services, domestic and international transportation policy, transportation economics, customer service, and the changing technology of transportation. Articles from related areas, such as third party logistics and purchasing and materials management are acceptable as long as they are specifically related to the management of transportation and logistics activities.

Submissions from industry practitioners and from practitioners co-authoring with academicians are particularly encouraged in order to increase the interaction between the two groups. Authors considering the submission of an article to the *JTM* are encouraged to contact the editor for help in determining relevance of the topic and material.

The opinions expressed in published articles are those of the authors and do not necessarily reflect the opinions of the editor, the Editorial Review Board, Delta Nu Alpha Transportation Fraternity, or Georgia Southern University.

PUBLISHING DATA

Manuscripts. Four (4) copies of each manuscript are to be sent to Dr. Jerry W. Wilson, Georgia Southern University, P. O. Box 8154, Statesboro, GA 30460-8154. Manuscripts should be no longer than 25 double-spaced pages. Authors will be required to provide electronic versions of manuscripts accepted for publication. Guidelines for manuscript submission and publication can be found in the back of this issue.

Subscriptions. The *Journal of Transportation Management* is published twice yearly. The current annual subscription rate is $35 in U.S. currency. Payments are to be sent to the editor at the above address.

MANAGEMENT DEVELOPMENT AND RETENTION PROGRAMS IN U.S. THIRD-PARTY LOGISTICS FIRMS

Robert Lorin Cook
Central Michigan University

Brian J. Gibson
Auburn University

ABSTRACT

To provide quality logistics services, it is essential for third-party logistics (3PL) firms to develop an effective human resource program that ensures successful development and retention of qualified managers. By reporting the results of a survey of current U.S. 3PL firm development and retention practices and experiences regarding junior managers, this article provides a benchmark for 3PL firm managers who seek to improve management development and retention programs. Efforts to improve human resource programs should focus on improving orientation programs, mentoring, job enrichment, formal career planning, job relocation assignments, educational support, training and compensation.

INTRODUCTION

The market for third-party logistics (3PL) services is growing and will continue to grow. In a recently published study of 3PL firms, respondents experienced annual growth rates of more than 40 percent during the period 1995-1998 (Berglund et al. 1999). It is estimated that the U.S. 3PL services market will grow to $85 billion by 2002, which represents *only* a 12.5 percent market penetration rate (Konezny and Beskow 1999; Delaney and Wilson 2000).

The 3PL firms are companies, other than the buyer or seller, that specialize in performing one or more logistics services that could be performed by the buyer or seller. The logistics services most frequently provided by 3PL firms to manufacturers and merchandisers include: inbound and outbound transportation management, warehousing management, and freight bill payment/auditing (Bardi and Tracey 1991; Leahy, Murphy and Poist 1995; McGinnis, Kochunny and Ackerman 1995; Lieb and Randall 1996a; Sink and Langley 1997; Boyson et al. 1999; Langley, Newton and Tyndall 1999; Lieb and Peluso 1999; Murphy and Poist 2000).

A critical aspect of providing effective and efficient 3PL services involves the successful

development and retention of managerial human resources. There are significant reasons for 3PL firms to focus efforts in this area. First, in the 3PL market, services are the key products delivered to customers. As a result, 3PL management expertise is an important competitive factor. In fact, in three consecutive annual surveys (1996, 1995, 1994) of 3PL firm CEO perceptions, CEO's identified "*company employees / expertise*" as the most important factor that distinguishes their companies from the competition (Lieb and Randall, 1996b).

Second, the scope of logistics planning and operations continues to expand across corporate functions, supply chain organizations and economies of the globe (Cooper, Lambert and Pagh 1997; Bowersox, Closs and Stank 1999; Hammer 1999). As the field broadens, logistics managers must add new knowledge to their existing knowledge base. In addition, a significant portion of the knowledge base changes frequently (The Global Logistics Team, Michigan State University, 1995). For example, changes in information and material handling technology, international shipping regulations, packaging and environment regulations, and production and logistics asset capabilities require managers to frequently refresh their knowledge in these areas (LeMay and Carr 1999; Harps 2000).

Third, the demand for junior and senior logistics managers continues to grow as evidenced by the high salary gains for logistics managers who switch companies in the tight labor market (Cooke 2000); and the growing need for logistics managers by start-up and established companies engaged in various aspects of electronic commerce (Bauknight 2000). This results in a highly competitive market for quality logistics management talent among 3PL firms, manufacturers, merchandisers, consulting firms and governmental organizations. Such a labor market environment necessitates a vigorous management retention effort.

To provide quality logistics services in this growing market, it is essential for 3PL firms to develop an effective human resource program that ensures successful development and retention of qualified managers. By reporting the results of a survey of current U.S. 3PL firm development and retention practices and experiences regarding junior managers, this article provides a benchmark for 3PL firm managers who seek to improve management development and retention programs.

METHODOLOGY

Reviews of literature in the human resource management and logistics fields were used to identify important policy and procedural issues. The human resource management literature revealed a number of general policies and procedures pertaining to employee development and retention. The logistics literature provided information regarding the types of training that junior managers might need and the sources of training materials and programs (LaLonde and Powers 1993; Melbin 1996; CLM Staff 1998; Ivancevich 1998; Noe et al. 1998; Trunick 1998; LeMay and Carr 1999). Junior manager positions were defined as those positions that required five or less years of logistics experience.

As a result of the literature review, several questions were identified in each area.

Development questions were:

1. What methods are used to develop junior managers?
2. What critical general management skills are developed?
3. What critical job related skills are developed? and
4. How are organizations supporting development activities?

Retention questions pertaining to junior managers were:

1. What is the retention rate?

2. What are the critical reasons for job turnover?

3. What is the relocation experience?

4. What is the job rotation experience?

Survey Instrument and Data Collection

A series of in-depth personal interviews were conducted with 3PL firm CEO's, human resource executives and senior operating managers to further specify types of policies and practices in each of the general research areas. The information was utilized to design a detailed ten page mail questionnaire. The first draft of the questionnaire was pre-tested using a small sample of senior 3PL firm executives. These executives were asked to critique the survey instrument and offer suggestions for improvement. The feedback from these executives enabled the researchers to improve the survey instrument and tailor the questions to the 3PL industry.

The 40 largest U.S. 3PL firms (based on net logistics revenue) were identified using Armstrong's Guide to Third-party Logistics Service Providers. An additional 60 U.S. 3PL firms were identified using the same source plus Inbound Logistics and the Contract Logistics Database (Editor 1996; Armstrong 1998; Stratton 1998). One questionnaire was mailed to each firm. The initial mailing resulted in 19 usable responses. A follow-up telephone call and mailing to non-respondents resulted in an additional 22 usable responses. Of the 100 questionnaires mailed, none were undeliverable because of wrong or changed addresses. The effective sample size, then, was 100.

Forty-one completed surveys were returned. The response rate of 41 percent (41/100) was acceptable because of the high management level of the respondents and the length of the questionnaire. Sixty percent of the 40 largest third-party firms in the logistics industry responded. These respondents account for 67 percent of the total revenue and 64 percent of the total employees of the 40 largest 3PL firms.

Since 3PL firm junior managers may work in various types of positions (e.g. operations supervisor, logistics analyst), the researchers requested development and retention information regarding the three positions within the firm that had the most junior management jobs. The 41 respondents provided data pertaining to 103 junior positions.

Non-respondents were contacted by telephone to determine the reasons for non-response, although non-response bias was not measured quantitatively. Two reasons for non-response were identified. First, the ten page survey instrument appeared to be a time consuming task and senior executives are time sensitive. Second, in some firms, a number of individuals would have had to provide data in order to complete the questionnaire. In such cases, the questionnaire was routed through a number of individuals and "lost" or "filed."

Data Analysis

Respondent firms were categorized using two demographic variables that are commonly used to describe 3PL firms: primary service provided and firm size. First, firms were categorized by primary service provided into four types: *Integrated Logistics Service (ILS) Provider, Transport Service (TS) Provider, Warehouse Service (WS) Provider*, and *Specialized Service (SS) Provider* (freight forwarding, customs support, information, financial or environmental services). Second, firms were categorized by total annual revenue into three sizes: *Large 3PL Firm*- greater than $400 million, *Medium 3PL Firm*- $100 million - $400 million; and *Small 3PL Firm*- less than $100 million. These categories were determined by performing an ABC analysis on the 3PL firms listed in *Armstrong's Guide to Third-party Logistics Service Providers* (See Table 1).

The 103 junior management positions were categorized by key position activities and requirements into seven position types:

TABLE 1
RESPONDENT DEMOGRAPHICS

Variable	Number of Firms (N = 41)	Percentage of Firms (P = 100)
Firm Type		
ILS Provider	12	29
TS Provider	11	27
WS Provider	9	22
SS Provider	9	22
Firm Size		
Large (> $400M)	15	37
Medium ($100-400M)	15	37
Small (<$100M)	11	26
	Number of Positions (N = 103)	**Percentage of Positions (P = 100)**
Job Position		
Operations Supervisor	30	29.1
Logistics Coordinator	18	17.4
Logistics Analyst	15	14.6
Management Trainee	13	12.6
Technical Support	10	9.7
Sales Representative	10	9.7
Operations Manager	7	6.8

Operations Supervisor–supervises hourly operations personnel, project activities and/or logistics functions including transportation and warehousing; *Logistics Coordinator*–coordinates one aspect of logistics operations such as customer service or transportation; *Logistics Analyst*–provides logistics decision support for strategic planning, operational planning, and operational performance and control; *Management Trainee*–participates in a junior training program, and may be rotated through various positions; *Technical Support*–provides technical support to information technology, industrial engineering and other logistics functions, includes those positions that require MIS or engineering degrees; *Sales Representative*–sells 3PL services to customers; and *Operations Manager*–manages supervisory team, multiple logistics functions and is responsible for overall operational performance, includes those positions that require some experience or an MBA (See Table 1).

The completed surveys were coded, entered into Microsoft Excel 2000 and analyzed using SPSS Release 9.0 for Windows. The survey responses were both qualitative and quantitative. Therefore, a wide variety of analytical techniques were used to interpret the data. Responses containing nominal data were analyzed using simple frequency counts and percentages, cross tabulation, and Pearson Chi-Square tests. Responses containing ratio data were analyzed using means, standard deviations, t-tests, and analysis of variance (ANOVA) with post hoc pairwise multiple comparisons (Tukey HSD). All statistical tests were conducted at a 95 percent confidence interval (p-value < .05).

RESEARCH RESULTS

Development Policies and Practices

There were a number of significant findings regarding junior logistics manager development

policies and practices in 3PL firms. These findings are presented in the next four sections.

Development Methods Used. Five methods are used to develop managers in a majority of the junior positions. These methods are: internal training (98 percent), external training (87 percent), mentoring (65 percent), job rotation (59 percent) and Master of Business Administration (MBA) degree financial support (52 percent). Interestingly, less than one-half of the positions are provided with planned job progression (48 percent), career counseling (43 percent) or encouragement to complete professional certification programs (28 percent).

Comparisons of development methods used by firm type shows SS Providers leading in junior manager development in six of ten methods used. SS Providers use career counseling and certification programs for a significantly higher proportion of positions than expected. However, ILS Providers use career counseling and TS Providers use certification programs for a significantly lower proportion of positions than expected (See Table 2).

Management Skills Developed. Survey respondents identified the critical management skills provided to junior logistics managers through formalized training. There is no "universal" management skill training required for junior positions in 3PL firms. No individual skill is required in more than three-quarters of the job positions. However, as shown in Table 3, nine types of general management training are provided to a majority of the junior manager positions: sexual harassment avoidance, new employee orientation, communicating, performance evaluation, goal setting, safety, conflict resolution, leadership and team building.

TABLE 2
DEVELOPMENT METHODS USED BY FIRM TYPE

Development Methods	Overall % of Positions Using N=103	p-value	SS Provider % N=24	WS Provider % N=21	TS Provider % N=27	ILS Provider % N=31
In-House Training	98		100	95	100	97
External Training	87		92	86	93	77
Mentoring	65		75	52	63	68
Job Rotation	59		50	67	70	52
MBA Degree Financial Support	52		46	52	59	52
Planned Job Progression	48		58	48	41	45
Career Counseling	43	.002	**67**	33	56	19
Professional Certifications	28	.012	**46**	43	11	19
Encouraged to Obtain an MBA Degree	18		13	14	30	16
Time off given to Obtain MBA Degree	2		8	0	0	0

Note: Chi-Square tests (p-value<.05) revealed that **bold** percentages are significantly higher than expected. Underlined percentages are significantly lower than expected.

Comparisons of general management training by firm type yielded significant differences. SS Providers have the most extensive training; requiring a majority of junior positions to train in 90 percent of the listed training areas. ILS Providers have the least training, requiring a majority of positions to train in only 20 percent of the listed training areas. Notably, a higher than expected proportion of SS Provider manager positions receive training in goal setting, conducting meetings, budgeting and planning skills, and a lower than expected proportion of ILS Provider manager positions receive training in goal setting, safety, team building, presentation skills, conducting meetings, organization/planning and planning skills (See Table 3).

3PL firm size has an impact on the percentage of junior logistics management positions that receive general management training. Small firms require the most training. As shown in Table 4, a higher than expected percentage of manager positions receive training in small firms regarding six management skills: sexual harassment avoidance, safety, team building, organization, delegation skills and planning skills. In contrast, a lower than expected

TABLE 3
GENERAL MANAGEMENT TRAINING BY FIRM TYPE

Required General Management Training	Overall % of Positions Using N=103	p-value	SS Provider % N=24	WS Provider % N=21	TS Provider % N=27	ILS Provider % N=31
Sexual Harassment Avoidance	73		88	75	75	70
New Employee Orientation	65	.002	58	45	**96**	70
Communicating/ Listening	62		54	85	71	57
Performance Evaluation	61		63	60	63	70
Goal Setting	55	.001	**83**	65	63	30
Conflict Resolution	53		75	45	46	57
Safety	53	.001	58	**85**	63	30
Leadership	52		67	70	50	40
Team Building	51	.049	63	70	54	33
Hiring/Terminating	48		50	65	46	43
Time Management	48		50	50	58	43
Project Management	41		58	35	29	47
Presentation Skills	40	.026	50	45	58	20
Diversity Training	39		58	30	33	40
Conducting Meetings	37	.003	**63**	45	42	13
Organization/Planning	35	.030	38	55	46	17
Budgeting	34	.002	**67**	30	17	30
Delegation Skills	34		50	35	38	23
Planning Skills	34	.022	**54**	30	46	17
Negotiation	23		29	20	38	13

Note: Chi-Square tests (p-value<.05) revealed that **bold** percentages are significantly higher than expected. Underlined percentages are significantly lower than expected.

percentage of manager positions receive training in medium-sized 3PL firms regarding five management skills: sexual harassment avoidance, safety, team building, organization and budgeting.

Job Skills Developed. Respondents were asked to identify the training that junior logistics managers receive regarding job-related knowledge. A majority of managers receive training about company and client policies and procedures as shown in Table 5. In addition, twenty to fifty percent of the logistics managers are exposed to various logistics functions, technologies and vehicle/equipment operations.

With the recent emphasis on improving supply chain efficiency and effectiveness, it is surprising that less than one-fifth of these managers receive training on tools used to improve supply chains such as benchmarking, process re-engineering and pull systems. Additionally, the recent shift to process-oriented rather than function-oriented supply chain management should lead 3PL firms to provide training outside the traditional logistics functions. However, few 3PL junior

TABLE 4
GENERAL MANAGEMENT TRAINING BY FIRM SIZE

Required General Management Training	Overall % of Positions Using N=103	p-value	Small Firm N=28	Medium Firm N=37	Large Firm N=38
Sexual Harassment Avoidance	73	.000	**96**	54	84
New Employee Orientation	65	.038	48	77	74
Communicating/ Listening	62		76	71	53
Performance Evaluation	61		72	69	55
Goal Setting	55		64	49	63
Conflict Resolution	53		64	51	55
Safety	53	.000	**88**	34	55
Leadership	52		60	51	55
Team Building	51	.012	**76**	37	53
Hiring/Terminating	48		64	49	42
Time Management	48		56	34	61
Project Management	41		40	40	47
Presentation Skills	40		48	49	32
Diversity Training	39		36	34	50
Conducting Meetings	37		52	40	29
Organization/Planning	35	.001	**60**	14	42
Budgeting	34	.016	48	17	45
Delegation Skills	34	.018	**56**	37	21
Planning Skills	34	.013	**60**	26	29
Negotiation	23		36	17	24

Note: Chi-Square tests (p-value<.05) revealed that **bold** percentages are significantly higher than expected. Underlined percentages are significantly lower than expected.

TABLE 5
JOB RELATED TRAINING BY FIRM TYPE

Required Training Types	Overall % of Positions Using N=103	p-value	SS Provider % N=24	WS Provider % N=21	TS Provider % N=27	ILS Provider % N=31
In-House Operating Procedures	84		92	95	85	75
Services Offered	82		92	81	93	71
Customer Service Policies	75		79	67	93	68
In-House Software	73		79	62	85	71
Spreadsheet Software	57		75	43	67	50
Client Operating Procedures	55		67	57	59	46
Client Customer Service policies	53		71	57	44	50
Client Performance Goals	49	.032	67	48	59	29
Client Software/ Information Systems	49	.023	67	52	26	57
ISO 9000	48		67	48	44	39
Quality Management	47	.022	58	29	**67**	36
Database Software	45		42	57	41	46
Hazardous Materials Certification	43		29	43	59	43
Transportation Management	38	.022	**58**	14	44	36
Proposal Development	32	.008	**58**	14	22	36
Forecasting	30		46	24	33	21
Inventory Management	29	.038	33	**52**	15	25
Barcode Technology	27	.002	8	**57**	33	18
Benchmarking	24		25	14	37	21
Vehicle/Equipment Operation	23	.000	13	**62**	26	4
International Documents	18	.000	**46**	5	26	0
Process Engineering	17		25	14	7	21
JIT/Pull Systems/Kanban	16		8	14	11	29
Selling Skills	14		33	5	15	4
Labor Union Rules	14		4	19	22	11
Purchasing Management	7		25	0	4	0
Inventory Certification (APICS)	2		0	5	0	4
Transportation Certification (AST&L)	0		0	0	0	0
Purchasing Certification (NAPM)	0		0	0	0	0

Note: Chi-Square tests (p-value<.05) revealed that **bold** percentages are significantly higher than expected. Underlined percentages are significantly lower than expected.

managers are receiving training regarding production operations or purchasing. In fact, less than two percent are involved in general management certification programs in production and inventory management (APICS) or purchasing management (NAPM).

There are significant differences in job-related training by firm type (See Table 5). SS Providers have a higher than expected percentage of managers engaged in training related to transport management, proposal development and international documents and a lower than expected percentage of managers involved in barcode technology training. WS Providers train a higher proportion of managers in inventory management, barcode technology and equipment operation and a lower proportion of managers in quality management, transport management and proposal development. TS Providers have a higher than expected percentage of managers engaged in quality management training and a lower than expected percentage of managers engaged in client software and inventory management training. ILS Providers have a lower than expected proportion of managers involved in training pertaining to client performance goals, equipment operations and international documentation.

Regarding job-related training by position, no statistically significant findings can be reported, however, a number of observations can be made. Sales Representatives are the most highly trained as evidenced by the fact that this is the only position where a majority of managers are trained in a majority of the training areas displayed in Table 6. Training is focused on company marketing policies, learning about customers, proposal development and selling skill development. Operations Supervisors and Operations Managers receive considerable job related training which is focused primarily on customer goals and training to support or improve company operations such as quality management, ISO 9000, hazardous materials transport and equipment operations training. Technical Support and Logistics Analyst positions also receive considerable training. Training for these support functions focuses on company and client software and information systems. Secondary training areas include forecasting, inventory management, process reengineering and benchmarking. Management Trainees and Logistics Coordinators receive the least training.

Development Support. 3PL firms were asked to provide the preferred sources used in training junior logistics managers. Of the sources provided, 62 percent were external to the 3PL firm and 38 percent were internal. The six most preferred sources are: in-house training, professional business organizations (e.g. CLM), university programs, training organizations, on-the-job training and consulting firms.

Regarding the most used external source, Professional Business Organizations (PBO), respondents were asked to identify the sources used to train junior managers and how these sources support 3PL training efforts. Four-fifths of the 3PL firms use PBO's to support training for junior logistics managers. The three primary forms of support are: PBO training materials used during in-house training (54 percent), PBO seminars and workshops attended by managers (49 percent) and PBO annual conferences attended by managers (41 percent). A breakdown of the specific PBO's used and how 3PL's use these organizations to support training is provided in Table 7. Overall, CLM, AMgtA, and WERC are used as training sources by the highest proportion of 3PL firms. The three leading sources of in-house materials are CLM, AMgtA and ATA. The leading sources of seminars among PBO's are AMgtA and CLM. The primary annual conference attended by 3PL junior managers is CLM.

Retention Practices and Experiences

There were significant findings regarding 3PL junior manager retention practices and experiences. These findings are presented in the next four sections.

TABLE 6
JOB RELATED TRAINING BY POSITION

Required Training Types	Overall % of Positions N=103	Sales Rep % N=10	Ops Sup % N=30	Ops Mgr % N=7	Tech Supt % N=10	Log Ana % N=15	Mgt Trn % N=13	Log Coor % N=18
In-House Operating Procedures	84	**90**	**97**	**86**	**80**	**67**	**54**	**94**
Services Offered	82	**90**	**83**	**86**	**80**	**73**	**85**	**78**
Customer Service Policies	75	**90**	**83**	**86**	40	**73**	**77**	**72**
In-House Software	73	**90**	**70**	**86**	**100**	**60**	**69**	**66**
Spreadsheet Software	57	**80**	43	**86**	**50**	**60**	**61**	**56**
Client Operating Procedures	55	**70**	**53**	**57**	**80**	**70**	38	**56**
Client Customer Service policies	53	**80**	**57**	**71**	**50**	**60**	38	**56**
Client Performance Goals	49	**70**	**50**	**71**	**50**	**50**	31	**50**
Client Software/ Information Systems	49	**70**	40	**57**	**90**	40	23	**50**
ISO 9000	48	20	**60**	**57**	40	47	23	**61**
Quality Management	47	**50**	**63**	43	**50**	47	31	28
Database Software	45	**70**	30	**57**	**60**	**60**	23	44
Hazardous Materials Certification	43	20	**63**	**57**	20	27	46	39
Transportation Management	38	**60**	43	14	20	47	31	33
Proposal Development	32	**90**	23	43	40	47	15	6
Forecasting	30	**60**	27	29	**50**	40	31	0
Inventory Management	29	40	33	29	20	40	31	11
Barcode Technology	27	20	40	14	30	13	46	11
Benchmarking	24	30	23	0	**50**	33	38	0
Vehicle/Equipment Operation	23	10	**53**	29	0	0	31	6
International Documents	18	**60**	20	29	0	7	8	17
Process Engineering	17	20	10	0	**50**	20	31	0
JIT/Pull Systems/Kanban	16	0	20	0	10	20	23	17
Selling Skills	14	**80**	3	14	10	7	15	0
Labor Union Rules	14	0	33	14	0	0	15	6
Purchasing Management	7	40	7	0	10	0	0	0
Inventory Certification (APICS)	2	0	3	0	0	7	0	0
Transportation Certification (AST&L)	0	0	0	0	0	0	0	0
Purchasing Certification (NAPM)	0	0	0	0	0	0	0	0

Note: **Bolded** percentages are at least 50 percent.

TABLE 7
PROFESSIONAL BUSINESS ORGANIZATION SOURCES USED

Professional Business Organization	Use Materials In-House (% Firms)	Attend Courses & Seminars (% Firms)	Attend Annual Conference (% Firms)
Council of Logistics Management (CLM)	27	22	34
American Management Association (AMgtA)	20	32	5
Warehouse Education Research Council (WERC)	10	15	10
International Warehouse Logistics Assn. (IWLA)	10	15	5
American Trucking Association (ATA)	15	7	7
American Marketing Association (AMA)	12	5	5
National Customs Brokers/Forwarders Association of America (NCB/FAA)	2	7	5
The Educational Society for Resource Management (APICS)	2	5	2
American Society of Transportation & Logistics (AST&L)	2	5	2
Produce Marketing Association (PMA)	2	2	2
National Association of Purchasing Management (NAPM)	0	2	2
Material Handling Institute (NHI)	2	0	0
National Industrial Transportation League (NITL)	2	0	0

Retention Rates. 3PL firms were asked to identify the retention rate for junior logistics management positions at one year intervals for a three year period. The retention rate data is summarized in Table 8. The overall mean percentage of managers retained by the end of each year is: 1st year (88 percent), 2nd year (76 percent), 3rd year (67 percent). Respondents reported that after the 3rd year, one-tenth of positions have 100 percent retention, one-quarter of the positions have at least 90 percent retention, three-quarters of the positions have at least 60 percent retention, and one-quarter of the positions have 50 percent or less retention.

ANOVA tests revealed significant differences in retention rates by firm size. Large firms have significantly lower retention rates than Medium or Small firms after the 1st and 2nd years and lower retention rates than Small firms after the 2nd year.

No statistically significant differences in retention rates between firm type or management positions were detected. However, after the 3rd year, ILS Providers retention rates are the lowest. Also, while most position retention rates are near 68 percent after the 3rd year, Operations Managers retention is 85 percent and Management Trainee retention is only 40 percent.

Reasons For Job Turnover. Respondents identified the five most frequent reasons for junior logistics manager turnover and rank ordered these reasons based on frequency. The major reasons for turnover are listed in Table 9: better financial offer in logistics (69 percent), better financial offer outside logistics (59 percent), did not like geographic location of job/new job (41 percent), did not like corporate culture, policies or structure (41 percent), fired for inadequate performance (39 percent) and not challenged by job (37 percent). No other reasons were mentioned in the top five by more than 17 percent of the respondents. Two-fifths of the respondents ranked "better financial offer in logistics" as the most frequent reason for

TABLE 8
JUNIOR LOGISTICS MANAGER RETENTION RATES

Demographics			Mean Retention Rates (% of Positions)		
			1st Year	2nd Year	3rd Year
	Overall	N = 103	88	76	67
Firm Size	Small	N = 28	96	85	80
	Medium	N = 37	91	78	67
	Large	N = 38	**80**	**65**	**56**
Firm Type	TS Provider	N = 24	86	79	74
	WS Provider	N = 21	92	77	71
	SS Provider	N = 27	89	77	68
	ILS Provider	N = 31	88	71	56
Position	OPS Manager	N = 7	96	89	85
	Log Analyst	N = 15	93	83	71
	Log Coordinator	N = 18	88	77	69
	OPS Supervisor	N = 30	87	76	68
	Tech Support	N = 10	93	73	67
	Sales Rep	N = 10	82	73	66
	Mgt Trainee	N = 13	83	66	40

Note: ANOVA tests (p-value<.05) revealed that **bold** numbers are significantly lower than underlined numbers in the same column

TABLE 9
REASONS FOR JOB TURNOVER

Reasons	Number of Times Mentioned	% of Firms
Received Better Financial Offer in Logistics	28	69
Received Better Financial Offer in Other Field	24	59
Did Not Like Geographic Location of Job	17	41
Did Not Like Corporate Culture, Policies, Structure	17	41
Fired for Inadequate Job Performance	16	39
Not Challenged by Job	15	37
Had Personality Conflict with Manager	7	17
Quit to Continue Education	7	17
Had Personality Conflict with Employees	6	15
Downsized	5	12
Quit Because Spouse Relocated	3	7
Did Not Like Long Hours, High Stress	2	5
Quit to Raise Family	2	5
Quit Because of Family Member Health	1	2
Did Not Like Work Environment	1	2
Quit Because of Personal Health	1	2

turnover. Chi Square tests yielded no significant differences in turnover reasons by firm type, firm size or management position.

Job Relocation Practices. When asked how often junior managers were relocated in the initial three years of employment, respondents provided the data highlighted in Figure 1. The mean number of relocations is .80 with a standard deviation of 1.03. Eighty-three percent of the management positions require zero or one relocation over the three year period. Only 9 percent of the positions require three or four relocations in the initial three years.

Analysis of Variance tests revealed significant differences in the number of job relocations by firm type and job position. The mean number of job relocations in the first three years by job type are: TS Providers 1.19, WS Providers .90, ILS Providers .50, and SS Providers .46. TS Providers relocate new managers more often than ILS or SS Providers (p-value = .028). Also, the mean number of relocations by position are: Management Trainee 2.36, Operations Manager 1.14, Sales Representative .80, Logistics Coordinator .78, Operations Supervisor .47, Technical Support .30 and Logistics Analyst .20. Management Trainees move significantly more often than all other positions (p-value = .000).

Job Rotation Practices. Respondents were asked to provide the number of job title changes that occur for logistics managers in the initial three years. Figure 2 displays the results. The mean number of title changes is 1.3 with a standard deviation of .89. The most frequent response is 2 job rotations (37 percent). Surprisingly, 23 percent of the positions had no job rotation in three years and another 34 percent had only one job change in three years. ANOVA tests found no significant differences in job rotation by firm type, firm size or management position.

FIGURE 1
NUMBER OF JOB RELOCATIONS IN THE FIRST THREE YEARS

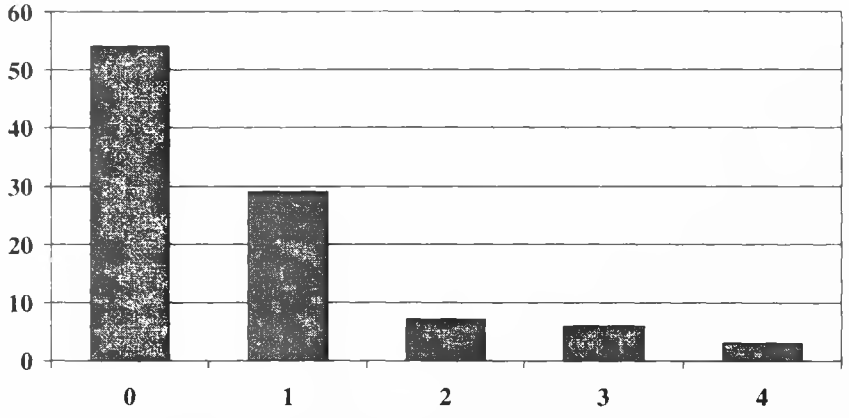
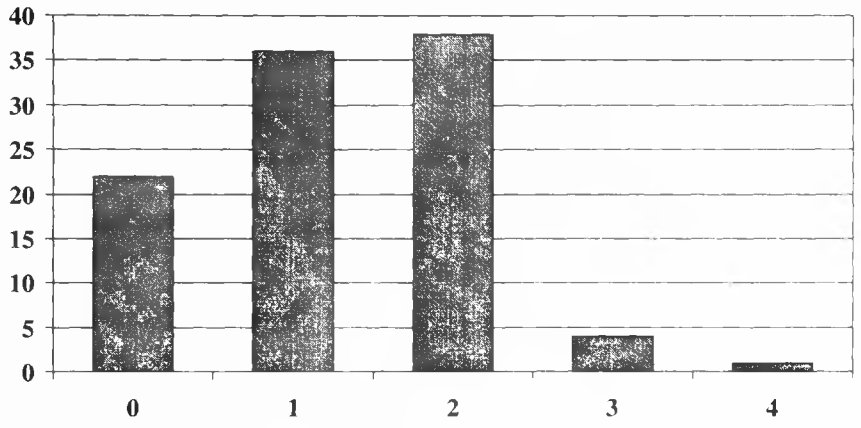


FIGURE 2
NUMBER OF JOB TITLE CHANGES IN THE FIRST THREE YEARS



CONCLUSIONS AND MANAGERIAL IMPLICATIONS

Development Conclusions

Even though an effective human resource management development program can have a significant positive effect on the quality and costs of logistics services provided, a significant percentage of 3PL firm management development programs lack critical policies and procedures necessary to effectively develop and retain junior management. Managers in more than one-half of the junior management positions are **not** provided with career counseling or planned job progression. Also, managers in more than one-third of the positions do not receive mentoring or have opportunities for job rotation. Finally, managers in less than 30 percent of the positions are encouraged to pursue additional education (e.g. professional certifications, MBA degrees). Although the five most widely used general management training topics for 3PL junior managers are: sexual harassment avoidance, new employee orientation, communicating, performance evaluation and goal setting; four of these five topics are not provided to managers in more than one-third of the 3PL junior managers positions. Small 3PL firms require the most general management training. In addition, SS Providers lead while ILS Providers lag in providing general management training to junior managers.

A majority of 3PL junior management positions are supported with job-related training pertaining to company and client policies and procedures. However, less than 40 percent of the positions receive training regarding the major logistics functions and less than 20 percent of the positions receive training on process improvement tools or cross-functional areas such as purchasing or production operations. SS Providers lead and ILS Providers lag in providing job skill training. Also, Sales Representative positions receive the most job skill training and Management Trainees and Logistics Coordinator positions receive the least. The primary source of 3PL junior manager training involves programs developed in-house. The secondary

training source is professional business organizations. However, managers in only one-half of the positions use PBO training materials in-house, attend seminars or annual conferences.

Retention Conclusions

The overall retention rate in 3PL firm junior manager positions decreases approximately 12 percent per year in the initial three years. Consequently, the mean retention rate after three years is 67 percent. Larger 3PL firms have lower retention rates. Also, ILS Providers have the lowest retention rates after three years.

The primary reasons for junior manager turnover are: received a more attractive financial offering; did not like geographic job relocation; lack of fit with corporate/culture pollicies; structure; fired for inadequate performance and not challenged by job. Most of the factors that impact retention can be significantly affected by human resource management policies and procedures.

The mean number of geographic job relocations in the initial three year period for junior managers is less than one (.80). However, the mean number of relocations for a Management Trainee is 2.36 and this position has the lowest retention rate after three years (40 percent).

The mean number of job rotations in the initial three year period for junior managers is slightly more than one (1.3). However, almost one-fourth of the positions experienced no job rotation in three years.

Implications

To remain competitive in the third-party logistics services market, U.S. 3PL firms must develop effective human resource management policies and programs to improve the development and retention of talented junior managers. Efforts to improve human resource programs should focus on improving orientation programs, mentoring, job enrichment, formal career planning, job relocation assignments, educational support, training and compensation. Improvements in these areas should include:

- Developing of a comprehensive New Employee Orientation Program that covers the following: overview of company and culture, key company policies and procedures, compensation and fringe benefits, substance abuse policies and accident prevention, employee and union relations, and physical facilities. Such a program can reduce turnover which is high during this initial period of adjustment.

- Implementation of a New Employee Orientation Program that includes the following steps: a general orientation briefing conducted at a pace that facilitates new employee learning, an invitation by management to seek help and advice when needed, assignment to a specific mentor who is experienced and will be working with the new employee, gradual and systematic introduction to co-workers and supervisors, some on the job training prior to increasing job demands, and an orientation follow-up in the first month to determine how well the new employee is adjusting to the new position/environment.

- Utilizing several strategies to ensure that the junior manager receives a challenging initial assignment. Specific strategies include: assigning new managers to the most challenging available job; assigning a new manager to a non-challenging job and then enriching the job by giving the new manager increased authority/responsibility; permitting the new manager to interact directly with customers/clients; and/or allowing the new manager to implement some of their own solutions without supervisor permission (empowerment); and assigning a new manager to a supervisor that has high but achievable performance expectations. Providing junior managers with a challenging initial job assignment increases retention.
- Providing the junior manager with formalized career planning that includes career counseling and career pathing (planned job

progression). These career planning efforts should include the likely training and geographic job relocations that will be necessary in order for the manager to move along the specific career path within the organization.

- Minimizing the number of geographic job relocations needed for junior managers to pursue a given career path to increase retention.

- Integrating career planning and workforce planning by involving both human resource personnel and operating managers in both planning processes. A joint planning effort is critical because 3PL firm workforce plans can be altered dramatically by the addition or subtraction of a major customer contract. For example, major changes in customer sites or services to be performed could require significant management retraining or geographic relocation.

- Encouraging and supporting junior managers who seek additional professional education such as logistics certifications or MBA degrees. Management expertise is a key competitive weapon for 3PL firms.

- Designing an aggressive corporate junior management training program that focuses on improving management performance and contains the following basic steps: determine training needs and objectives by performing a needs assessment, develop criteria to select candidates for training, determine training material content, select sources and methods of training, plan and implement training, and evaluate training effort. Training that improves management performance can reduce turnover.

- Ensuring that required general management training for junior managers include the following areas: sexual harassment/diversity, new employee orientation, communication, performance evaluation and goal setting. Diversity training is necessary given the increasing diversity of the logistics workforce. New employee orientation programs can increase manager retention. Communication training can impact management effectiveness and, consequently, compensation. Training to improve how managers are evaluated is critical because performance evaluations are used to determine training needs and compensate managers. Training to improve goal setting can result in better management performance evaluations and as a result, increased compensation and retention.

- Designing a job skills training effort that includes: knowledge that is pertinent to the specific job assignment to improve job performance; process improvement tools such as flowcharting and TQM techniques that enable managers to re-engineer supply chain process; and cross-functional training in areas such as purchasing and production operations to facilitate a broader management understanding of the supply chain participants and their operations.

- Utilizing the plethora of logistics-related professional business organization training opportunities that are so readily available.

- Providing a competitive compensation package to junior managers in the tight labor market to increase retention.

REFERENCES

Armstrong, R. (1998), *Who's Who in Logistics? Armstrong's Guide to Third-party Logistics Service Providers*, 6th, Ed., Armstrong & Associates, Inc., Stoughton, WI.

Bardi, E. and Tracey, M. (1991), "Transportation Outsourcing: A Survey of U.S. Practices," *The International Journal of Physical Distribution & Logistics Management*, 21 (3): 15-21.

Bauknight, D. (2000), "The Supply Chain's Future in the e-economy," *Supply Chain Management Review*, 4 (1): 28-35.

Berglund, M., van Laarhoven, P., Sharman, G. and Wandel, S. (1999), "Third-party Logistics: Is There a Future?" *The International Journal of Logistics Management*, 10 (1): 59-70.

Bowersox, D., Closs, D. and Stank, T. (1999), "21st Century Logistics: Making Supply Chain Integration a Reality," *Supply Chain Management Review*, III (3): 44-51.

Boyson, S. Corsi, T. Dresner, M. and Rabinovich, E. (1999), "Managing Effective Third-party Logistics Relationships: What Does It Take?," *Journal of Business Logistics*, 20 (1): 73-100.

CLM Staff (1998), *Careers in Logistics*, Council of Logistics Management, Oak Brook, IL.

Cooke, A. (2000), "Annual Salary Survey—Managers on the Move," *Logistics*, 39 (4): 44-51.

Cooper, M. Lambert, D. and Pagh, J. (1997), "Supply Chain Management: More Than a New Name For Logistics," *The International Journal of Logistics Management*, 8 (1): 1-14.

Delaney, R. and Wilson, R. (2000), "*11th Annual "State of Logistics Report*," National Press Club, Washington, DC.

Editor, (1996), *T&D Contract Logistics Database*, Penton Publishing Co., Cleveland, OH, 1-85.

Hammer, M. (1999), "Reengineering The Supply Chain: An Interview," *Supply Chain Management Review*, 3 (1): 20-27.

Harps, L. (2000), "Stand Out in a Crowd: Continue Your Logistics Education," *Inbound Logistics*, 20 (2): 33-40.

Ivancevich, J. (1998), *Human Resource Management*, 7th, Ed., Irwin/McGraw-Hill, Boston, MA.

Konezny, G. and Beskow, M. (1999), *Piper Jaffray Equity Research- Third-party Logistics*, Piper Jaffray, Minneapolis, MN, 1-57.

LaLonde, B. and Powers, R. (1993), "Disintegration and Reintegration: Logistics of the Twenty-First Century," *The International Journal of Logistics Management*, 4 (2): 1-12.

Langley, C., Newton, B. and Tyndall, G. (1999), "Has the Future of Third-party Logistics Already Arrived?" *Supply Chain Management Review*, 3 (3): 85-94.

Leahy, S., Murphy, P. and Poist, R. (1995), "Determinants of Successful Logistical Relationships: A Third-Party Provider Perspective," *Transportation Journal*, 35 (2): 5-13.

LeMay, S. and Carr, J. (1999), *The Growth and Development of Logistics Personnel*, Council of Logistics Management, Oakbrook, IL.

Lieb, R. and Peluso, L. (1999), "The Use of Third-party Logistics Services by Large American Manufacturers: The 1999 Survey," *Annual Conference Proceedings Council of Logistics Management*, 1: 159-171.

Lieb, R. and Randall, H. (1996a), "A Comparison of the Use of Third-Party Logistics Services by Large American Manufacturers, 1991, 1994, and 1995," *Journal of Business Logistics*, 17 (1): 305-320.

Lieb, R. and Randall, H. (1996b), "1996 CEO Perspectives on the Current Status and Future Prospects of the Third-Party Logistics Industry in the United States," *Annual Conference Proceedings Council of Logistics Management*, 1: 428-429.

McGinnis, M., Kochunny, C. and Ackerman, K. (1995), "Third-party Logistics Choice," *The International Journal of Logistics Management*, 6 (2): 93-102.

Melbin, J. (1996), "The Changing Face of Logistics Careers," *Distribution*, 95 (11): 34-37.

Murphy, P. and Poist, R. (2000), "Third-party Logistics: Some User Versus Provider Perspectives," *Journal of Business Logistics*, 21 (1): 121-133.

Noe, R., Hollenbeck, J., Gerhart, B. and Wright, P. (1998), *Human Resource Management: Gaining a Competitive Advantage*, 2nd, Ed., Richard D. Irwin, Chicago, IL.

Sink, H. and Langley, C. (1997), "A Managerial Framework for the Acquisition of Third-Party Logistics Services," *Journal of Business Logistics*, 18 (2): 163-189.

Stratton, F. (1998), "100 Top 3PL's," *Inbound Logistics*, July, 46-56.

The Global Logistics Research Team, Michigan State University (1995), *World Class Logistics: The Challenge of Managing Continuous Change*, Council of Logistics Management, Oak Brook, IL.

Trunick, P. (1998), "New Demands for Tomorrow's Manager," *Transportation and Distribution*, 39 (12): 18-19.

AUTHOR BIOGRAPHY

Robert Lorin Cook, Ph.D. is Professor of marketing and logistics at Central Michigan University. He received his Ph.D. in marketing at Michigan State University. He has published in numerous journals including: *Journal of Business Logistics, International Journal of Physical Distribution and Logistics Management, International Journal of Purchasing and Materials Management, Journal of Production and Inventory Management, Journal of Marketing Education, and Journal of Advertising Research.* His primary research interests are in the areas of applying information system technologies to logistics systems and logistics education.

AUTHOR BIOGRAPHY

Brian J. Gibson is associate professor of logistics at Auburn University. He received a Ph.D. in logistics and transportation from the University of Tennessee. He has published in numerous journals including: *International Journal of Physical Distribution and Logistics Management, Defense Transportation Journal, Transportation Quarterly, Journal of Transportation Management* and the *Journal of Transportation Law, Logistics, and Policy.* His primary research interests are in the areas of transportation service quality, the role of logistics in e-Commerce and logistics education.

EXAMINING AMERICA'S LOGISTICS PROGRAMS VIA THE INTERNET

Joe B. Hanna
Auburn University

William Compton
University of North Carolina–Wilmington

ABSTRACT

This study uses the Internet and a two phase methodology to help gain insight into the current state of America's logistics programs. Phase I examines logistics program structure while phase II employs a modified, electronic version of the Delphi technique to help examine global logistics education practices. The results of the research indicate that, while key differences exist in America's logistics programs, academicians of the discipline largely agree on the relative importance of key functional areas of the discipline. However, a potential gap may exist between the skills addressed in logistics and business education programs and the skills required for successful global logistics practice.

INTRODUCTION

As we embark on a new millennium, many issues remain to be addressed regarding the path that logistics education will take. It is almost universally recognized at this time that the contemporary logistics program can no longer function as a purely operational or technical degree program and that new graduates at the start of the 20th Century must demonstrate a variety of abilities and skills to effectively compete for jobs. There is an increasingly heightened awareness of logistics as a vital function of successful business practice and educators are responding by providing far more than just a technical degree program. Logistics is no longer simply serving a support role to the traditional functional business disciplines.

Increasingly there is evidence in the academic and practitioner literature that curricula are being reviewed and revised as educational strategies become increasingly guided by a consumer driven focus. While the future of the discipline is very promising, with logistics majors and information systems majors leading the way in new job opportunities, industry is looking for graduates with the basic skills already in place that will add value and justify the attractive salaries that are being offered. In short, industry is also looking to academia to provide a knowledge base that effectively bridges the gap between theory and practice.

This paper will present the issues that are currently being addressed and present a guideline for the current status and future direction of academic pedagogy and research in the logistics discipline. To provide structure to our study we looked at the following areas: (1) Basic skills requirements, including core competencies within the field of logistics as well as those cross-disciplinary skills considered essential in a logistics major; (2) Internal resource support, including funding sources, internships, and fellowships; (3) External resource support, including chaired positions, grants, linkages to professional organizations, courses taught by industry specialists; and, (4) Structure of logistics offerings, including whether courses are offered as part of another field or major, as an individual major, or as a separate department within a college.

The Internet revolution and the global marketplace have combined to help create many new business opportunities for many U.S.- based firms. Logistics operations have recently played a very large, strategic role in global business practices, especially as information technology has increased consumer expectations of quick delivery schedules. In several cases, well-developed global information logistics systems have been used to help achieve a competitive advantage by serving as a significant cost-cutting and customer service enhancing tool (Richardson, 1996; Novack, Rinehart, and Wells, 1992).

Challenges Facing Logistics

An increasingly global, technology-based marketplace appears to have created a gap between logistics education practices and the needs of the marketplace. While numerous challenges face practitioners of any discipline, many believe the ability to address two key issues: 1) information/ Internet technology, and, 2) the globalization of business will determine industry success in the near future. Given the importance of cutting edge knowledge of technology and globalization, companies hiring entry-level logistics professionals will frequent the logistics programs most adequately dealing with these issues in the classroom.

Some have criticized business schools for being slow to respond to the quickly evolving, technological marketplace and globalization of business (Arpan, Folks, and Kwok, 1993; Porter and McKibbin, 1988). Applying new technologies to logistics education is paramount if logistics students are to succeed as logistics practitioners in the 21st century. Student involvement with new technology must include an introduction to updated hardware and a variety of current types of software. In addition to the continuing technological evolution, students practicing logistics in the 21st century will be faced with an increasingly global environment. As global companies expand throughout the world to take advantage of benefits offered around the world, entry-level logistics practitioners will be faced with performing international shipping duties, handling foreign sourcing, and dealing with multi-country trading blocks. While it is clear the short-term business environment will continue to become increasingly global in nature, some have contended that business schools have failed to sufficiently internationalize their curricula (Porter and McKibbin, 1988).

STUDY

The Internet has dramatically changed the way we conduct ourselves as business educators. While the total impact of Internet technology on society is yet to be determined, it is clear the Internet has changed many aspects of our lives. Exploring ways to facilitate academic research through improved data collection techniques could result in a streamlined research process, producing more timely research findings. Dissemination of accurate research results in a timely manner will help educators to contribute to practitioners, thus reducing the perceived "gap" between the two communities.

The primary purpose of the current research is to better understand the current state of logistics education by examining logistics programs offered by 4-year universities in the United

States. Given the obvious importance of information technology on logistics practice and the corresponding criticism of academicians for failing to bridge the discipline gap between theory and practice, the researchers elected to collect data for the study via the Internet. Exploration of the Internet as a viable way to collect data for academic research may help to streamline the research process, improving the timeliness of research results and making them more applicable to logistics practitioners.

A two phase study methodology was employed with stage one being an Internet-based survey instrument. The survey was designed to address several issues including basic program organization, relative importance of different logistics functions, size and financial support of various programs, and basic qualifications of faculty. The second phase of the research was also Internet-based. This portion of the research also attempts to utilize information technology, specifically the Internet, to assess the current state of global logistics education in U.S. institutions of higher learning. This study differs from previous research in two basic ways. First, this portion of the research specifically explores the impacts of information technology adoption and the global marketplace on logistics education practices. Second, phase II of the research uses Internet technology in conjunction with the Delphi method specifically to facilitate data collection. The authors are unaware of previous business education research which utilizes the Internet to assemble an expert panel to help employ the Delphi methodology of data collection.

Phase I Analysis

Phase I of the research began with survey development which followed traditional procedures for survey instrument construction. Questions dealt with a variety of basic issues relevant to assessing the current state of logistics programs in the U.S. Key issues examined include structure and size of the program, logistics program offerings and instructor qualifications, the identification and relative importance of key functions of logistics programs, funding sources, and student opportunities.

The advent of supply chain management has ushered in another new era of logistics and the need for new managerial skills and competencies (Gammelgaard and Larson, 1999). Today, logistics success depends upon effective internal integration and well-coordinated, multi-organization networks. Logistics educators are once again challenged to determine the relevant issues, tools, and techniques that must be introduced into the classroom. To ignore the emergence of such current issues as globalization, information technology, and supply chain management as key drivers of logistics strategy would poorly prepare students for the challenges and conditions of the current marketplace.

As a result, the phase I survey instrument used multiple items to measure several constructs considered to be key portions of supply chain management. Each construct was designed to measure a key supply chain and/or logistics function. Functions examined include: purchasing, transportation, inventory management, information technology, distribution, and strategic alliance/relationship management. Respondents were asked to rate several individual statements as to their importance to logistics education. All survey responses in this section were based on a 5-point Likert scale.

Potential study participants were determined by examining past attendees of the Council of Logistics Management's Logistics Educators' Conference. A list of 121 study participants was compiled and each was sent a postcard asking for study participation and providing an Internet web address. Respondents were asked to visit the web site and answer the on-line survey instrument. After a two week period, reminder cards were sent to individuals in the original sample who had not completed the survey. A total of 50 respondents provided usable responses, yielding a response rate of 41.3%.

Phase I Results

Program Structure. Of the 50 respondents to the initial Internet-based survey (Phase I), 20% indicated the logistics program at their school is administered through its own department while the majority of respondents, (54%) indicated their logistics program is combined with another discipline to make up a department within the college. Course offerings range from a low of 1 course per year to a maximum of 25 course offerings per year. The average number of annual course offerings is approximately 10.

Instructors. College classrooms are filled with a diverse group of instructors. Over two-thirds of logistics programs (68%) utilize full-time tenure track faculty who only teach logistics courses. Additionally, over 60% of the programs also use full-time tenure track faculty who concurrently teach courses in the logistics discipline and at least one other discipline (e.g., marketing, management). Forty-four percent of respondents indicated their programs rely in part on business professionals to teach selected courses. However, when asked if their program would be increasing or decreasing the number of business professionals in the classroom, the results were roughly split with 51% expecting an increase and 49% expecting either no change or a decrease.

Student Requirements and Placement. While most logistics programs (84%) do not require participation in an internship prior to graduation, 88% indicated they do encourage students to participate in an internship prior to graduation. In addition, 75% of respondents indicated their program contains students who participate in other types of work opportunities related to the field (e.g., summer work, part-time work while attending school). Thirty nine of the fifty respondents (78%) indicated at least 85% of the students graduating from their logistics program were successfully employed in a logistics-related job within three months of graduation.

Funding and Support. Recognizing that funding is often an issue, the researchers elicited responses on how various logistics programs supplement their primary funding source. Sponsorship of a conference and providing external services to businesses are the two most often cited sources of supplementary funding. Conducting educational seminars, conducting research for business, personal or alumni donations, business donations, and receiving government grants were also occasionally mentioned as external sources of funding a logistics program. Interestingly, not only do most programs feel the need to supplement their primary funding source, only six of fifty respondents indicated faculty members of their logistics program have the opportunity to receive an endowed faculty position. Clearly, funding of programs is a challenge that must be dealt with by those teaching in most logistics programs.

Relative Importance of Logistics Functions. Building on past research which has identified key logistics functions (Williamson, Spitzer, and Bloomberg, 1990), the current research attempts to determine the relative importance of different functions on successful logistics practice. The six key functions (constructs) included in the survey were: distribution, information management, purchasing, transportation, inventory management, and strategic alliance/relationship building. Each critical construct was measured with the use of multiple items considered to be critical to performing each function. For example, one item used to measure the purchasing construct was the ability to perform competent supplier evaluation and selection.

The reliability of the multi-item measurement instrument was assessed by examining the Cronbach's Alpha measure. Seven items were used to measure the *distribution* construct with a Cronbach's Alpha measure of .76. Six items were used to measure *information management* (alpha = .72), *transportation* (alpha= .88), and *strategic alliance / relationship building* (alpha = .87). Five items were used to measure *purchasing* (alpha =

.80) and *inventory management* (alpha = .78). Each of the six constructs were measured with multiple items with a reliability in excess of .70 which is considered to be sufficient for basic, exploratory research (Nunnally, 1978).

Subjects were asked to evaluate the importance of each item designed to measure each construct. All items were based on a five-point Likert scale, anchored by important/unimportant. Responses were uniformly high (between 4.2 and 4.8 out of five) for four of the six constructs. In short, the respondents saw four of the six constructs and most of the individual items measuring each construct to be important. This suggests that while the appropriate constructs have been properly identified, the raw importance ratings would not have sufficient variance for useful discrimination. To overcome this issue, the respondents' ratings were standardized around his/her own mean rating—see Cunningham, Cunningham, and Green 1977, and Gurwitz 1987.) Survey respondents were also asked to rate the relative importance of each of the six constructs by allocating 100 percentage points among them (e.g., purchasing 10%, transportation 20%, information management 30%, inventory management 15%, strategic alliance/relationship management 5%, and distribution 20%). Below are the combined results which illustrate that information management is regarded as being the most important of the six constructs questioned. Information management had both the largest percent allocation of the six logistics functions (constructs) and the highest mean score of the six constructs. See Table 1 for complete results.

Phase II Analysis

During phase II, the future environment for global logistics practitioners is investigated. This part of the research assembles a group of individuals with international logistics experience to help identify the key characteristics of the global logistics environment for the year 2000 and beyond. Once key characteristics are identified they are placed into a survey format for additional data collection. The survey instrument allows for a rating of key characteristics necessary for

TABLE 1
RELATIVE IMPORTANCE OF SIX KEY FUNCTIONS OF LOGISTICS

Key Logistics Construct in order of Importance	Mean Importance Rating (n=50)	Standard Deviation and Range of Ranking Percentage	Mean of Multiple Items
1) Information Management	18.59 %	sd= 6.59: 10 % to 40 %	4.76
2) Inventory Management	17.84 %	sd= 5.88: 5 % to 30%	4.63
3) Transportation	17.71 %	sd= 7.09: 5 % to 40%	4.59
4) Purchasing	17.57 %	sd= 10.46: 5% to 65%	4.57
5) Strategic alliance/ relationship building	14.12 %	sd= 5.89: 5 % to 30%	4.23
6) Distribution	12.02 %	sd= 5.32: 5% to 20%	4.05

successful future global logistics practice. Data analysis will help identify the concepts and skills that should be developed and taught by global logistics educators.

The initial step of the research was to assemble a knowledgeable panel of global logistics practitioners via the Internet. The pre-qualification process reviewed the credentials of each individual to identify subjects with appropriate background for participation in a study of global logistics practices. Minimum qualifications to be included as a panel participant included first-hand past experience in global logistics in the period from 1990 to 1998. Candidates initially judged to have an appropriate background were further screened. To be included as a panel participant the practitioner must currently be employed in a job dealing directly with international logistics issues on a regular basis. Examples of job titles represented by the panel of practitioners include international logistics manager, global operations specialist, international trade facilitator, and international logistics systems analyst.

While considerable care was taken to assure research participants were qualified to provide information pertaining to global logistics education issues, the sample could still be considered to be one of convenience. The researchers felt the use of this type of sample was justified in part because of the desire to administer the Delphi methodology via the Internet. While use of the Internet limits the population available for participation in the study, the researchers contend exploring the potential benefits of a new data collection method outweighs the limitations of using a convenience sample. Nevertheless, it should be noted that convenience samples have several limitations including potential bias by participants and poor generalizability of the results.

In order to forecast the key characteristics necessary for successful practice of global logistics in the future, the researchers used a *modified*, electronic version of the Delphi technique. The Delphi method was chosen as the model for this phase of the research because it offers decision makers a systematic approach for predicting future events that might be too nebulous for more objective forecasting approaches (Riggs, 1983; Rohrbaugh,1979). The Delphi method brings practitioners together in a group, conference, or seminar setting to share ideas and reach a consensus about the future (Sniezek,1989).

The Internet may be an effective way to employ the Delphi method because it allows panel participants who can not physically gather together to be assembled electronically while maintaining anonymity. If designed properly, one advantage of using the Internet is to maintain anonymity of each panel member throughout application of the Delphi method while still allowing for electronic feedback, debate, and comment. The message board used to assist in data collection did not divulge any information about which panel participants were involved in the panel discussions. This helps to provide equal weight to the input from each panel participant by preventing powerful members in the panel from unduly influencing or swaying the opinion of others. The Delphi method has traditionally been used in face to face settings. However, this exploratory research modified the traditional administrative format of the Delphi technique by using the Internet to bring panel participants together in a group.

Past research indicates the Delphi method usually consists of roughly thirty participants because larger groups typically create few additional ideas and limit discussion and in-depth exploration (Delbeq, Van De Ven, and Gustafson, 1975). Table 2 provides a detailed description of the characteristics of panel participants and survey respondents from phase II of the research. Thirty-three "experts" made up the initial panel of experts for application of the Delphi method. The 33 subjects meeting the established criteria were given a two week period to participate in an anonymous, interactive Internet message board. Specific times for chat room participation were

communicated to each of the participants. The first step in applying the Delphi method is to allow each panel participant to provide narrative input into a series of general questions and statements dealing with the future of global logistics practices. Responses to the initial session are then summarized, placed in a conventional survey format, and provided to a select group of practitioners who have previously agreed to serve on a subsequent panel. Subsequent panel members are asked to provide additional input by ranking each knowledge area by order of importance. Of the 33 original panel participants, 21 also agreed to fill out the survey instrument developed from input of the original panel. Another 17 international logistics academicians and practitioners also completed the survey instrument.

Phase II Results

Past studies demonstrate the effectiveness of the Delphi technique in identifying incidents where genuine agreement about changes or alterations

TABLE 2
DEMOGRAPHICS OF
STUDY PARTICIPANTS

Trait	Original Panel (n = 33)	Subsequent Survey Respondents (n = 38)
Gender:		
Male	91%	92%
Female	9%	8%
Age:		
25 to 40	21%	17%
41 to 55	46%	70%
Over 55	33%	13%
Years of Experience:		
0 to 5 years	12%	17%
6 to 10 years	18%	21%
Over 10 years	70%	62%
Type of Firm Represented:		
Multinational	70%	58%
3rd Party	9%	13%
Government	18%	29%
Other	3%	0%

might exist (Dull, 1988). The accuracy and reliability of this method as a forecasting tool has been well established in a variety of research settings (North and Pyke, 1969). The Delphi methodology has previously been used to investigate international business issues (Daniels, 1991) and explore curriculum improvement (Blair and Uhl, 1993). In this phase of the research the method is used to help forecast industry changes and educational needs facing global logistics as we progress into the twenty-first century.

While the Delphi technique is usually considered to be an unstructured research methodology, there is often a basic set of general procedures followed during data collection (Rowe, Wright, and Bolger, 1991). However, there is no standard method of analyzing the data once collected. The data analysis technique chosen depends primarily on the objectives of the study and the perspective of the researcher(s) conducting the study. During the current study, content analysis was the technique chosen to categorize responses from panel participants.

Content analysis is a systematic and objective data analysis technique designed to use set procedures to make valid inferences about the context of the data (Krippendorff, 1980; Stone, Dunphy, Smith, and Ogilvie, 1966). This data analysis method has proven to be very effective for a wide variety of purposes including the coding of open-ended survey questions and panel comments (Berelson, 1952). Specifically, content analysis was chosen for this research in part because it has proven to be helpful to data collection when specific theoretical underpinnings are lacking (Kolbe and Burnett, 1991). Given the pedagogical nature of this phase of the research and a corresponding lack of a testable theory, the researchers felt content analysis was an appropriate methodology.

At the conclusion of the two week period, the researchers and a graduate assistant gathered the data and performed a content analysis. The three coders were given basic instructions regarding content analysis. Once the initial content analysis was completed, the researchers attempted to assure the results were reliable. Reliability assessment for content analysis is performed by examining the overall stability, reproducibility, and accuracy of the classifications (Weber, 1990). To help assure reliability of the content analysis, each of the three evaluators performed an initial analysis of the responses. Two weeks later the entire evaluation process was repeated. As is common when assessing reliability of categorization, reproducibility and stability of the results were both examined. Reproducibility was a respectable 85% during the content analysis phase of the research while stability was judged to be a very adequate 93%.

Once the electronically administered Delphi Method of data collection was complete, a survey instrument based on key issues previously identified by industry experts was provided to select members of the original panel plus additional academicians and practitioners. Respondents were asked to use a 1 to 7 Likert type scale (one being highly important) to identify the importance of each key issue on the successful practice of global logistics.

TEN MOST IMPORTANT SKILL AREAS FOR GLOBAL LOGISTICS PRACTICE

Table 3 illustrates the ten most important skill areas for successful global logistics practice. Interestingly, the two skill areas perceived to be most important by practitioners (written/oral communication skills and understanding of cultural issues) are traditionally considered to be non-business areas of study. The area considered to be the third most important to successful global logistics practices (ability to get along with co-workers) was categorized in this research to be a basic personality trait. In summary, the three attributes considered to be most important by the global logistics practitioners and academicians participating in this research are areas most consider to be external to business logistics programs.

TABLE 3
TOP TEN KEY AREAS TO GLOBAL LOGISTICS PRACTICE

Areas of Study Key to Successful Global Logistics Practices	Mean (Original 33 Delphi Participants) (n=33)	Standard Deviation	Mean (Selected Delphi and Other Industry Participants) (n=38)	Standard Deviation
Written/oral communication skills	1.3[c]	1.1	1.1[c]	.9
Understand culture	1.6[c]	1.3	1.5[c]	1.2
Can get along with co-workers	1.8[d]	.8	1.5[d]	1.0
Strategic planning for logistics optimization	1.9[a]	.9	1.6[a]	1.0
Financial analysis (e.g., minimize total costs	2.2[a]	1.1	1.9[a]	.9
Sourcing & its impact on logistics	2.2[a]	1.1	2.1[a]	1.4
Being goal-oriented/internally motivated	2.3[d]	1.2	2.1[d]	.9
Negotiating and bargaining skills	2.3[b]	1.1	2.1[b]	1.1
Can analyze problems using critical thinking	2.3[c]	1.5	2.1[c]	1.3
Inventory management and its impact on logistics	2.3[a]	1.3	2.2[a]	1.3

* Items rated on a scale with 1 = highly important, 7= least important.
[a] Business: Logistics areas of study (4 areas)
[b] Business: Non-logistics areas of study (1 area)
[c] Non-Business areas of study (3 areas)
[d] Basic Traits (2 areas)

Several additional skill areas considered by practitioners to be important to global logistics practices (strategic planning, financial analysis, sourcing, and inventory management) are currently being taught as basic core concepts in most logistics programs. Fortunately, several of the concepts considered to be highly important by academics teaching logistics are also viewed to be important by practitioners. Consistent with prior research (Murphy and Poist, 1994), these results indicate logistics educators are doing a relatively good job of identifying and addressing core knowledge areas in logistics courses.

Conversely, only one of the top ten key skill areas (negotiating and bargaining skills) was categorized to be a topic typically taught in a general business curriculum. While logistics educators appear to be doing a relatively good job

of identifying and teaching many of the key skill areas required for successful global logistics practice, this study's results indicate general business educators may need to re-examine their curriculum. Academicians appear to be somewhat slow to respond to demands to offer key skill areas important for successful global logistics practice.

RESPONDING TO TECHNOLOGY, GLOBALIZATION, AND SUPPLY CHAIN MANAGEMENT

It is clear that schools need to continue to respond to the changing environment in their program offerings. Greater analytical and quantitative skills training combined with hands-on real-world problem analysis appears to be a key future trend (Closs and Stank, 1998). An example is the "tools" course developed for graduate students at the University of Tennessee in response to student demand for a course that would provide experience in management and decision support tools (Smith, Langley, and Mundy 1998). The barriers that they identify to the integration of education and practice of logistics have been the cost and ease of use of computer hardware, the availability of computer software, and limited educational resources. Cost and availability of computer resources has been previously cited as a major limitation in many academic institutions (Tyworth and Grenoble, 1991). The current survey corroborates the fact that information management is viewed as a critical component to successful logistics practice (See Table 1.). The shift from mainframe to micro-computer applications (Mentzer, Schuster, and Roberts, 1990) and the growing demand by students for computer assignments using transportation and logistics software packages (Rutner, Kent, and Gibson, 1996) appear to have altered the way educators are approaching technology in the classroom. With even the most data-intensive management applications being shifted from mainframe systems to client-server environments (Smith, Langley, and Mundy, 1998), cost and availability of computer resources should become less of a barrier to information technology application in the classroom. Additionally, the expanded assortment of application software, both general purpose applications, such as spreadsheets, as well as special purpose, logistics related applications, is likely to significantly reduced many of the barriers to integrating education and practice simply because of increased availability.

In a review of the relevant literature reflecting the challenges facing developing logistics/supply chain programs, Lancioni, Smith, and Forman (1998) identified the following barriers: disagreement among industry practitioners regarding the relative emphasis that should be placed on logistics training versus on the job training; the limits imposed by computer hardware, software, and other educational resources; and the fact that many businesses fail to recognize logistics management as a distinct field (Lancioni, Smith, and Forman, 1998). The results of the current research tend to support this previous research. Clearly there are some differences between what practitioners believe is important to successful logistics practice (primarily global practice) and what academicians are teaching in their programs (See Table 3). Furthermore, many logistics programs are administered through a department combining several disciplines (See Table 1). Perhaps this is in part because many universities do not yet accept logistics management as a distinct academic field or discipline.

Academicians appear to have responded to environmental changes by changing the focus of their logistics programs. In fact, several logistics programs have moved from product logistics to the movement of information through the logistics channels. As evidenced from information technology being ranked the single most important function of successful logistics practice, the focus has clearly changed from the movement of product to the flow of information (See Table 1). One outstanding example of how information technology has impacted logistics practice is the rapid development of the Internet

within the last five years. The electronic shopping mall spurred by the Internet has created new challenges to supply chain/ logistics education at a rate that would have been impossible to conceive just a few years ago (Ellram and Easton, 1997).

The power of the Internet is revolutionizing the field by accelerating the speed of information transmission and facilitating the flow in all directions throughout the supply chain. For example, trends in logistics are increasingly designed to add value to the process and respond to customer driven demands. In short, a move from a push to a pull perspective is becoming increasingly evident.

> The move from push to pull, by necessity, makes logistics a more important part of the organization and gives it more visibility. It also means that logistics professionals need new skills...they need familiarity with information systems, marketing, sales, and production planning (Richardson, 1996).

Purchase orders, shipping, tracing, billing, and reorder points are automated and designed for immediate response, cost cutting, and adding value. This pull-environment is compatible with the Internet. Besides radically altering the nature of consumer behavior, the explosive growth of the Internet is also replacing functions within the channels of supply traditionally intended to facilitate company-to-company communication and integration of logistics functions primarily through communication of information (e.g., electronic data interchange (EDI) systems).

MANAGERIAL IMPLICATIONS

Funding

We have recently seen logistics evolve from an operation role in support of traditional functional areas to a strategic partner in upper management operational planning. However, old habits die hard and territorial claims on limited resources in business schools have forced logistics educators into what has been an uphill struggle to establish their position within existing structures. Companies are looking for new hires with basic computer literacy, meaning the ability to use computers to access information, databases, and specific applications software tools. The level of experience varies with job description, but clearly a sufficient level of knowledge in basic logistics applications software, if not programing and systems engineering expertise, is essential.

The competition for limited resources is recognized as one of the major challenges facing logistics programs, but it can be viewed as a struggle for which proponents are well armed. First, in recognition of a recent trend in business school education in general, new standards for accreditation have become mission oriented and are resulting in business colleges allocating resources in accordance with a clearly defined mission. Logistics education, by its very nature, places more emphasis on the applied rather than the theoretical and, in fact, academic research in logistics is often discounted by faculty from other areas due to this focus on the practical (Allen and Poist, 1997). Second, career opportunities in logistics are growing at rates surpassing any other business major, except possibly information management, and this trend is expected to continue (Lancioni, Smith, and Forman, 1998). The current research confirms considerable levels of success with placement with over 85% of students placed in logistics related jobs within three months after graduation. Clearly, from a purely efficient markets perspective, the availability of well-paying jobs will generate increased demand for logistics course offerings, logistics majors within existing programs, and independent logistics programs.

Finally, business education in general is becoming more customer driven and programs around the country are turning to industry for funding and resources and are having to justify their existence in the process. Once again current research corroborates the fact that many

logistics programs around the country are supplementing their primary funding source with various types of secondary funding sources. Evidence of this can be seen in the many non-traditional formats that are being implemented, such as the explosive growth of distance learning programs, the team-teaching of courses, and the night and weekend classes that are being offered at many universities, including the larger well-established and well-funded institutions. Taken together, these forces appear to favor the logistics programs and indicate that they can legitimately lay claim to a larger and more equitable share of resources within the halls of academia.

Distance Education

People coming into the field today need to know where industry turns for knowledge and the best source for a wide range of knowledge is the professional organizations, such as the Council for Logistics Management and the Warehousing Education and Research Council (Fawcett, Vellenga, and Truitt, 1995). Logistics educators are exploring many of the newly available technologies for connecting logistics professionals and educators outside of the classroom, and finding support in professional organizations. While the cost for distance education technology may appear to be somewhat prohibitive now, the technology is evolving and questions remain on just how the needs of the consumer of these services (i.e. students and practitioners) and the university will be matched. There are those who argue that barriers of economics and hardware are formidable, and the benefits of a distance learning experience versus a live seminar are still unproven. Others extol the value of being able to bring together a network of experts through electronic networking (Richardson, 1996). By using the Internet to administer the Delphi methodology of data collection in a manner that assembles experts throughout the globe, this research has proven that assembling a network of experts through electronic networking capabilities is realistic. However, its effectiveness for educational purposes is as yet unproven.

Core Competencies and Basic Skills Requirements

A critical area that needs to be addressed is the depth and breadth of coverage expected of a logistics education. Some have suggested that industry perceives current practice as too narrowly focused (Armstrong, 1997; Richardson, 1996; Allen and Poist, 1997), a perception that is perhaps misplaced given the clearly inter-disciplinary nature of most logistics programs. Nevertheless, current research did discover certain discrepancies between what is necessary for successful global logistics practice and what is being taught in most logistics programs.

Past research (Murphy and Poist, 1994; Fawcett, 1992) indicates that the skills required of entry level, and even mid-level logisticians, are evolving rapidly as technology and the definition of logistics education changes. In the traditional program, the focus of the discipline has been on the physical distribution and tracking of material and courses were designed to treat logistics as serving a support role to existing functional areas such as marketing (logistics) or management (transportation). As such, it has sometimes been viewed as the "red-headed step child" of the mainstream academic disciplines and has been in a constant struggle to defend the few resources it has received. Once again, the current research continues to identify a need by faculty of logistics programs to enhance their primary source of funding with secondary funding sources.

Past research (Murphy and Poist, 1994) also indicates that academics and practitioners largely agree on many of the basic logistics skills required for success in the industry. The current research found this to be true when dealing with domestic logistics endeavors (Phase I). However, this is not necessarily the case in the global logistics arena (Phase II).

IMPLICATIONS FOR INTERNET DATA COLLECTION

Use of the Internet as a vehicle to collect data was highly successful in this attempt, especially in the highly experimental Phase II of the research. Given the underlying methodology (Delphi Technique), use of an interactive message board appeared to work well. Respondents participated regularly, interacted via messages to the message board, and remained anonymous throughout the entire panel discussion. No one panel participant appeared to be dominant and all messages appeared to be weighted roughly equal by other panel participants. While this was an exploratory study testing the possible advantages of using the Internet to administer the Delphi Technique, results appear promising. Future research should expand the investigation into possible uses of the Internet as a data collection mechanism. Specific research in the area of administering the Delphi Technique should expand on the current research in several ways. First, a further examination of the applicability and usefulness of information technology as an aid to the efficient collection of data is necessary. Second, a comparison of research results from Internet and non-Internet panels (Phase II) and survey (Phase I) should be compared to help assess data reliability and participation or response rates.

REFERENCES

Allen, Benjamin and Richard Poist (1997), "Some Challenges Facing Logistics Education at the New Millennium," *Journal of Transportation Management*, 9 (2): 1-8.

Armstrong, Richard D. (1997), "What Does a Logistician Look Like?" *Inbound Logistics*, (April): 24-30.

Arpan, Jeffery S., William R. Folks, Jr., and Chuck Kwok (1993), *International Business Education In the 1990's: A Global Survey*. The Academy of International Business.

Berelson, B. (1952), *Content Analysis in Communications Research*, New York: Free Press.

Blair, S. and Uhl, N. P. (1993), "Using the Delphi Method to Improve the Curriculum," *The Canadian Journal of Higher Education*, XXIII (3): 107-128.

Closs, David J. and Theodore P. Stank (1998), "Designing a Cross-Functional Curriculum for Supply Chain Education at Michigan State University," *Proceedings of the 27th Annual CLM Logistics Educator Conference*, (Anaheim): 27-47.

Cunningham, William H., Isabella C. Cunningham, and Robert T. Green (1977), "The Ipsative Process to Reduce Response Set Bias," *Public Opinion Quarterly*, 41: 379-384.

Daniels, J. D. (1991), "Relevance in International Business Research: A Need for More Linkages," *Journal of International Business Studies*, 22 (2): 177-186.

Delbeq, A., Van De Ven, A. H., and Gustafson, D. H. (1975), *Group Techniques for Program Planning*, Glenview, IL: Foresman.

Dull, Ray (1988), "Delphi Forecasting: Market Research Method of the 1990's," *Marketing News*, 22 (August): 17.

Ellram, Lisa and Liane Easton (1997), "The Internet: A New Forum for Teaching Supply Management," *Proceedings of the 26th Annual Transportation and Logistics Educators Conference* (Chicago): 115-138.

Fawcett, Stanley E., David B. Vellenga, and Lawrence J. Truitt (1995), "An Evaluation of Logistics and Transportation Professional Organizations, Programs, and Publications," *Journal of Business Logistics*, 16 (1): 299-314.

Fawcett, Stanley E. (1992), "Strategic Logistics in Coordinated Global Manufacturing Success," *International Journal of Production Research*, 30 (4): 1081-1099.

Gammelgaard, Britta & Paul Larson (1999), "Skills Competencies in Logistics Management," *Proceedings of the 28th Annual CLM Logistics Educator Conference*, (Toronto): 53-73.

Gurwitz, Paul M (1987), "Ipsative Rescaling: An Answer to the Response Set Problem in Segmentation Analysis," *Journal of Advertising Research*, (June/July): 37-42.

Kolbe, R. H. and Burnett, M. S. (1991), "Content Analysis Research: An Examination of Applications with Directives for Improving Research Reliability and Objectivity," *Journal of Consumer Research*, 18 (September): 243-250.

Krippendorff, K. (1980), *Content Analysis: An Introduction to Its Methodology*, Beverly Hills, CA: Sage.

Lancioni, Richard, Michael F. Smith, and Howard Forman (1998), "Developing Logistics and Supply Chain Programs in Colleges and Universities: Roadblocks and Challenges," *Proceedings of the Twenty-Seventh Annual Transportation and Logistics Educators Conference*, (Council of Logistics Management) (Anaheim, CA): 13-25.

Mentzer, John T., C. P. Schuster, and D. J. Roberts (1990), "Microcomputers Versus Mainframe Usage in Logistics," *The Logistics and Transportation Review*, 26 (2): 115-132.

Murphy, Paul R. and Richard F. Poist (1994), "Educational Strategies for Succeeding in Logistics: A Comparative Analysis," *Transportation Journal*, 33 (3): 36-48.

North, Harper O. and Donald Pyke (1969), "Probes of the Technological Future," *Harvard Business Review*, 47 (May-June): 68-76.

Novack, Robert A., Lloyd M. Rinehart, and Michael V. Wells (1992), "Rethinking Concept Foundations in Logistics Management," *Journal of Business Logistics*, 13 (2): 233-267.

Nunnaly, Jum C. (1978) *Psychometric Theory*, 2nd, McGraw-Hill: New York.

Porter, Lyman and Lawrence McKibbin (1988), *Management Education and Development: Drift or Thrust Into the 21st Century?* McGraw-Hill, New York.

Richardson, Helen L. (1996), "Logistics Education: Within Your Reach," *Transportation and Distribution*, 37 (2): 38-42.

Riggs, W. E. (1983), "The Delphi Technique: An Exposition and Application," *Technological Forecasting and Social Change*, 23: 89-94.

Rohrbaugh, J. (1979), "Improving the Quality of Group Judgement: Social Judgement Analysis & the Delphi Technique," *Organisational Behaviour and Human Performance*, 24 (73-92).

Rowe, G., Wright, G., and Bolger, F. (1991), "Delphi: A Reevaluation of Research and Theory," *Technological Forecasting and Social Change*, 39: 235-251.

Rutner, Stephen M., John L. Kent, Jr. and Brian J. Gibson (1996), "Using a Computer in a Logistics Course to Enhance Collaborative Learning," *Proceedings of the 25th Annual Transportation and Logistics Educators Conference*, ed. James M. Masters (Orlando, FL): 83-107.

Smith, Carlo, C. John Langley, and Ray Mundy (1997), "Removing the Barriers Between Education and Practice: Tools and Techniques for Logistics Management," *Proceedings of the 26th Annual Transportation and Logistics Educators Conference* (Chicago): 43-80.

Sniezek, Janet (1989), "An Examination of Group Process in Judgmental Forecasting," *International Journal of Forecasting*, 5: 171-178.

Stone, P.J., Dunphy, D.C., Smith, M. S., and Ogilvie, D. M. (1966), *The General Inquirer: A Computer Approach to Content Analysis*, Cambridge: MIT Press.

Tyworth, John, and William Grenoble (1991), "Spreadsheet Modeling in Logistics: Advancing Today's Educational Tools," *Journal of Business Logistics*, 12 (1): 1-26.

Weber, R. P. (1990), *Basic Content Analysis: Quantitative Applications in the Social Sciences*, 2nd Ed., Sage Publications.

Williamson, Kenneth C., Daniel M. Spitzer, and David J. Bloomberg (1990), "Modern Logistics Systems: Theory and Practice," *Journal of Business Logistics*, 11 (2): 65-86.

AUTHOR BIOGRAPHY

Joe B. Hanna is an assistant professor of logistics at Auburn University. He holds a bachelor of accountancy, master of accountancy, and Ph.D. (logistics and marketing) from New Mexico State University. Dr. Hanna has published in various academic journals and is coauthor of a Logistics textbook. His past employment includes experience in public accounting and several years with Phillips Petroleum Company and with Phillips 66 Chemical Company.

AUTHOR BIOGRAPHY

Bill Compton is an assistant professor of finance at UNC-Wilmington. He received his Ph.D. in finance from Florida State in 1996 and has also taught at Western Illinois University and Eastern Illinois University in the areas of corporate finance, investments, and international finance. Dr. Compton's recent research into financial investment optimization and market performance has been published in various academic journals.

CHEATING VIA ONLINE PAPER MILLS IN LOGISTICS EDUCATION

Kathleen H. Gruben
Georgia Southern University

Cathy Owens Swift
Georgia Southern University

Luther (Trey) Denton
Georgia Southern University

ABSTRACT

The growth of e-business is providing businesses and entrepreneurs the opportunity to develop niches targeting one of the largest groups of Internet users: university students. Unfortunately, one of these niches is online term paper mills, where students can purchase university quality term papers and then submit them in class as their own work. The purpose of this paper is (1) to identify what online term paper services are available; (2) to determine how many logistics term papers are offered by these services; and, (3) to suggest strategies that can be used by logistics faculty to suppress use of these materials.

INTRODUCTION

E-business, Internet-based commerce and Internet-enabled inter-organizational coordination (including supply chain management, consumer relationship management, virtual organizations, and business communities), are growing exponentially. Conservative projections indicate business-to-consumer sales will increase from $21.2 billion in 1999 to $97.5 billion in 2002, while aggressive projections indicate sales will increase from $95 billion in 1999 to $484 billion in 2002 (Cross 1999). Other projections indicate business-to-consumer transactions will swell to $108 billion (Sawhney and Kaplan 1999). Statistics further reflect that 17.3% of business-to-consumer transactions involve people of the traditional university student ages, while another 18.5% involve those who will be of college age in coming years (Cross 1999). Not surprisingly, businesses and entrepreneurs have developed niches on the Internet to target these young consumers. Unfortunately for professors and students alike, one of these niches, online term paper mills, is growing in popularity. A concern for professors is that term paper mills facilitate cheating, especially plagiarism.

How much of a threat are term paper mills to professors in logistics-related disciplines? The purpose of this paper is to address this issue through the following three research questions:

1. What online term paper services are available?

2. How many logistics term papers are offered by these services?

3. What steps can logistics professors take to minimize or eliminate students' use of these materials?

The focus will be specifically on the use of online term paper mills to facilitate student cheating.

CHEATING AND PLAGIARISM

Cheating on university campuses is nothing new. The problem was so prevalent in the late 1960s and early 1970s that Massachusetts enacted a 1973 statute criminalizing term paper sales to the state's students (Glasner 1997). Evidence shows that more students who regularly cheat exist than students who never cheat (Kerkvliet and Sigmund 1999). The Internet and e-business are making the practice of cheating easier, not to mention more available, to the general student population.

Cheating can be classified into four key categories: (1) representing someone else's work as one's own; (2) falsification of information; (3) misrepresentation of one's effort; or, (4) doing work for others (Sims 1993; Tom and Borin 1988). Representations of someone else's work as one's own, plagiarism, is found in two different formats. One type, "patchwork" plagiarism, involves copying and pasting excerpts from multiple sources without paraphrasing or citation. The second type is copying or submitting a previously created term paper and representing it as one's own work. Many times the source of these plagiarized papers is the plethora of paper mills that have established a niche through e-business.

Before one can make a judgement about the impact of the availability of term papers via the Internet, one must know the propensity for students to cheat. The general consensus is that a significant number of college students have cheated at some time during their college careers (Baird 1980; Crown and Spiller 1998; Hawley 1984). The reported range of cheaters is 3% to 98% (Crown and Spiller 1998). Two studies, Baird (1980) and McCabe and Trevino (1995), found that the level of self-reported undergraduate cheating varies by major.

These studies also reveal a factor disturbing to professors in colleges of business—the level of self-reported cheating is higher for business majors than for non-business majors (Crown and Spiller 1998). A recent study of marketing students found that 87% of students admitted to cheating at least one time during their university education (Swift and Nonis 1998). This statistic is of concern to logistics professors because many logistics courses are housed within marketing departments.

FUTURE GROWTH

Will cheating and plagiarism through the Internet continue to increase in the future? No one knows for sure, but examination of current Internet usage, projected Internet usage, and the growth in the number of e-businesses focusing on term papers indicate it probably will, particularly in North America. Projections indicate that North American adolescents will comprise more than 50% of all Internet users (13.7 million) under age 18 in 2001. By 2005, North American adolescent Internet users will total 36.9 million (Cross 1999).

A major concern to educators is how teenagers use the Internet. The number one use of the Internet for teens ages 13-18 is for homework with more than 80% of the users in this age group reporting this type of usage. Conducting research ranked fourth, with more than 60% reporting this form of Internet usage (Cross 1999).

Although similar statistics are not available, the potential for similar use exists for college students as 69% of college students own computers. Most of the remaining 31% have access to computers on campus. Ninety-five

percent use the Web, 57% use the Web daily, and 19% spend 10 or more hours each week on the Web (Cross 1999). With this level of exposure to the Internet, even the most honest students will invariably be exposed to one or more of the multitude of term paper mills through general searches for information about assigned research material.

Another indication that cybercheating will continue to increase is that the most frequently practiced forms of cheating behavior occur outside the classroom, where professors have little direct control over student behavior (Brown 1995). With this in mind, the tendency to succumb to the temptation of cybercheating may grow with the current trend toward distance learning and web based courses, where professors are not always physically present. Additionally, faculty and students are developing a complacency toward cheating (Bruinius and Clayton 1999). A recent "Who's Who" study revealed that even some of the nation's top students cheat. Eighty percent of the respondents admitted to cheating, a 10 point increase in 15 years. Alarmingly, more than half of the students surveyed did not think cheating was a "big deal" (Bruinius and Clayton 1999; Bushweller 1999).

Realizing the potential of cybercheating, several states have taken measures to eliminate or reduce the problem. Then Texas Governor George W. Bush signed a bill in June, 1997 making the sale of academic term papers to Texas students a Class C misdemeanor with a $500 fine (Bivens and Sahr 1997). In July of the same year, South Plains Community College in Levelland, Texas sent a letter to 40 web sites warning them about the new law (Macavinta 1997b). Texas was joined by 16 other states that passed laws making it illegal to sell term papers to students for use as their own work (Clayton 1997).

Trustees of Boston University filed a federal suit against eight term paper mills in 1997 (Basinger and McCollum 1997; Macavinta 1997a; Machlis 1997) and charged the defendants with violation of mail and wire fraud laws as well at the Racketeer Influenced and Corrupt Organizations Act (RICO) (www.jmls.edu). One of the defendants was Professor Abe Korn. The outcome of the case against Professor Korn is not known because it was settled out of court in January, 1998 (www.jmls.edu) and settlement cases generally have a non-disclosure clause. Litigation against the other seven defendants was resolved in December, 1998 with the court determination that the mail and wire fraud charges were unfounded and RICO was misused.

Although states and universities have taken measures to penalize e-businesses for the sale of term papers, the current investigation uncovered no cases that have been upheld against these firms. This lack of support from the legal system increases the importance of logistics educators' understanding of the availability and use of these resources.

ON-LINE TERM PAPER OPTIONS FOR LOGISTICS STUDENTS

Schoolsucks.com, the first online term paper mill to gain notoriety, was established on the Internet in 1996; however, it was not the first to become active. The Paper Store, which is linked to at least 14 of the sites included in the current research, was established as early as 1994. By 1997, the number of online term paper mills grew to approximately 40-70 sites (Bertagnoli 1997). The Paper Store has become a form of superstore, gaining power by linking to "free" sites such as *papercamp.com*, *essayworld.com*, *planetpapers.com*, and *schoolsucks.com*. The search engines on these free pages are difficult to find so students often search the fee-based papers found at the Paper Store while thinking that they are accessing "free" sites.

Most educators are concerned about the negative impact of these sites which is evidenced by the emergence of sites, such as plagiarism.com, which are designed to facilitate the educators detection of plagiarism via the Internet. However, many web site developers have a different point of view. For example, Kenny

Sahr, *schoolsucks.com*'s developer, claims the page is not designed for plagiarism, but to help faculty improve by forcing "lazy faculty members to come up with more creative and specific assignments" (Aunapu 1996, p. 40).

In April, 2000, a search of the Internet using the words "term papers" on several leading search engines, including Hot Bot, Alta Vista, Yahoo, About.com, and Infoseek, produced more than 5,000 hits on each engine. The search was limited to these engines because of the massive number of cites they revealed with a large amount of repetition. The researchers did not believe they would gain a significantly larger number of paper mills using additional engines.

The number of term paper mills was overwhelming, so the search was narrowed to the first 100 hits for each search. The sites that appeared on 2 or more of the searches were visited. The "logistics" search terms explained in the table legend were used to determine the availability of logistics papers. Upon closer examination of the sites, some trends were found.

- Many web sites are networked by a common business. For example, at least 14 sites including *12,000papers.com*, *fastpapers.com*, *bignerds.com*, and *paperwriters.com* are all owned by or linked to the Paper Store.

- Many of the sites are developing a niche by providing a search engine of several sites operated by other term paper mills. For example, *schoolsucks.com* has developed links to one of several Paper Store sites. The links are automatic when *schoolsucks.com* does not have a paper available in the specified topic area.

- Term paper web sites have a tendency to change locations. For example, Lord-X's Free Papers appeared in the search at *http://www.angelfire.com/me/freepapers* but when the site was accessed, the researcher was referred to *http://www.geocities.com/CollegePark/Library/9044/* while *http://www.termsnpapers.com* is discontinued but the page refers one to *http://www.acceptedpapers.com*.

- Web sites are focusing more on custom term papers than on pre-existing papers.

- Many of the "free" sites link into "fee" sites when a search is requested. For example, *www.free-term-papers.chuckiii.com* states it has free essays but when a search is conducted, *www.paperstore.net* is accessed and only papers with a price of $8.95 are listed.

Table 1 provides a sample of the matches found in that search, with the information organized in alphabetical order by the name of the service, followed by the web address, the number of logistics papers available, type of service offered, and the cost of the service, if available.

Two crucial factors reflected in the table delineate term paper service providers: type of service and cost. Services range from providing access to existing papers to conducting custom research and writing. Customers pay a premium for original work. One 1999 study revealed that custom paper prices begin around $19 a page, compared to $5 per page for pre-existing work (Campbell, Swift, and Denton 2000). Although some Web sites such as *schoolsucks.com* offer term papers for free or exchange for a new submission, others, such as *geniuspapers.com*, charge a membership fee or a flat fee for a complete paper. Still others charge up to $35.00 per page (see Table 1 through Table 3). Essentially, students can pay as little as $7.50 or as much as $1000 for completed papers (Rao 1999). Some term paper mills, for example, The Doctor, pay for referrals to increase the number of papers they sell as well as to help offset the cost of purchasing a paper. The peer pressures resulting from this practice may encourage more students to participate in cybercheating.

TABLE 1
SEARCH RESULTS FOR SELECTED WEB SITES

Internet Site	Web Address	L	T	PD	I	W	3PL	C	Cost*
12,000 Papers	http://www.12,000papers.com	17	39	35	0	5	0	Y	8.95/E 29.85/C
A1 Term Papers	http://www.A1-termpaper.com	0	5	1	0	0	0	Y	8.95/E 19.95 - 35.00/C
A+ School Paper	http://schoolpaper.com	No Access Without Membership						N	20.00 member
Academic Term Papers	http://www.acadimicterm-papers.com	11	37	1	0	1	0	Y	7.00/E 19.00 up/C
Accepted Papers	http://acceptedpapers.com	Unlimited - Custom Only						Y	14.95 19.95/rush
Advantage Papers	http://advantagepapers.com	Unlimited - Custom Only						Y	12.75 20.00/rush
All Papers	http://allpapers.com	Unlimited - Custom Only						Y	29.85
Big Nerds**	http://www.bignerds.com	17	39	8	0	0	0	Y	8.95/E 29.85/C
Cheater	http://www.cheater.com	Searches schoolsucks.com						N	Free
Cheap Research	http://cheapresearch.com	0	5	1	0	0	0	Y	5.00(75.00 max)/E 20.00 up/C
College Care	http://papers-online.com/	0	3	0	0	1	0	Y	5.95/E 16.95/C
College Term Papers **	http://www.collegetermpapers.com	17	39	65	0	0	0	Y	8.95/E 18.95/C
Coshe	http://www.coshe.com/	3	66	0	1	0	0	N	Free
Dauber Search	http://www.daubersearch.com	Unlimited - Custom Only						Y	Charges by # references

* Cost is per page unless otherwise specified

** Sites linked to the Paper Store

L = Logistics; T = Transportation; PD = Physical Distribution; I = Intermodal; W = Warehousing

3PL = Third Party Logistics Provider

E = Existing

C = Custom

TABLE 1
(continued)

Internet Site	Web Address	L	T	PD	I	W	3PL	C	Cost*
Discount Paper Camp**	http://www.papercamp.com	0	0	0	0	0	0	N	Free
		Links to Paper Store If Not Found							
The Doctor	http://members.tripod.com/~Termpapers/index.html	No Search Engine Unlimited - Primarily Custom						Y	5.00 up Quote
Dr. Gs IGRADU8	http://www.igradu8.com	Unlimited - Custom Only						Y	Quote
Essay World**	http://www.essayworld.com	0	0	0	0	0	0	N	Free
		Links to Paper Store If Not Found							
Evil House of Cheat	http://www.cheathouse.com	10	242	0	2	9	0	N	Exchange, Link to Home pg, or 9.95 member
Fast Papers **	http://fastpapers.com	18	47	200+	0	18	0	Y	8.95/E 29.85/C
Free Essays	http://www.freeessay.com	No Papers - Offers Links to 11 Free Sites							NA
Free Term Papers**	http://www.free-term-papers.com	0	0	0	0	0	0	N	Free
		Links to Paper Store If Not Found							
Genius Papers	http://geniuspapers.com	No Access Without Membership						N	9.95 member
Hired Pens	http://www.hiredpens.com	Unlimited - Custom Only							10.00 14.94/rush
Lord-X's Free Papers	http://www.geocities.com/CollegePark/Library/9044	0	0	0	0	0	0	N	Free
Madpapers	http://madpapers.com	No Access Without Membership						N	7.95 member
Net Essays	http://netessays.net	Ranking Service with Links to Sites						NA	NA
Paper Due	http://www.paperdue.com	0	0	0	0	0	0		6.95 member

* Cost is per page unless otherwise specified ** Sites linked to the Paper Store

L = Logistics; T = Transportation; PD = Physical Distribution; I = Intermodal; W = Warehousing
3PL = Third Party Logistics Provider; E = Existing C = Custom

TABLE 1
(continued)

Internet Site	Web Address	L	T	PD	I	W	3PL	C	Cost*
Papers Highway	http://www.papershighway.com	Unlimited - Custom Only						Y	14.55 18.00/rush
Papers Inn	http://www.papersinn.com	Unlimited - Custom Only						Y	9.95 14.95/rush
Paper Masters	http://www.papermasters.com	Unlimited - Custom Only						Y	18.95 24.95/rush
Paper Store**	http://paperstore.net/	18	47	200	0	18	0	Y	8.95 18.95
Papers Online	http://papers-online.com	0	0	3	0	0	0	Y	5.95/E 16.95/C
PJ Marketing	http://www.pj-marketing	No Access Without Membership						N	9.95 Member
Planet Papers**	http://www.planetpapers.com	0	0	0	0	0	0	N	Free
		Links to Paper Store If Not found							
Research Papers	http://www.researchpaper.com	21	30	0	0	0	0	NA	Not Available
School Sucks	http://schoolsucks.com	0	0	0	0	0	0	N	Free
		Links to Paper Store If Not found							
Superior Term Papers	http://superior-termpapers.com	0	2	0	0	1	0	Y	7.50/E 18.95/C
Term Papers On File**	http://www.termpapers-on-file.com/	No Search Engine						Y	8.95/E 18.95/C

* Cost is per page unless otherwise specified ** Sites linked to the Paper Store

L = Logistics; T = Transportation; PD = Physical Distribution; I = Intermodal; W = Warehousing
3PL = Third Party Logistics Provider; E = Existing; C = Custom

With the large number of term paper mills found online, one might wonder how students can manage the information and select a good site. Several e-businesses have seized the opportunity to develop a niche by focusing on term paper mill rankings. For example, *netessays.net* ranks the top 25 term paper mills, *essaycrawler.com* ranks the top 50, and *chuckiii.com* ranks the top 100 sites. Each of these sites offers a link to the sites they have ranked. The top rankings on each site match. In addition to ranking sites, *essay-crawler.com* offers a search engine designed to search 11 free term paper mills for specified topics. These services can reduce the students' search time and, ultimately, make the cheating process easier.

One might think that the number of logistics papers available from the entrepreneurs that operate the online papers mills are limited, because logistics programs are just beginning to emerge at many universities. That is not the case. Each of the sites included in this study was searched for five different logistics topics: Logistics, Transportation, Physical Distribution, Intermodal, and Third Party Logistics Providers. Other logistics terms, such as supply chain management, purchasing, material management, fulfillment, and channels management, will be used in future research.

Results were mixed. Many of the web sites target a niche by limiting papers to specific disciplines. Therefore, not all sites offer logistics research. For example, *cheaters.com* and *freeessay.com* have no logistics papers available on their sites. However, many logistics papers were found on other sites and the availability of logistics papers will increase as the number of term paper web sites increases and the popularity of logistics as a field of study continues to grow.

"Third Party Logistics Provider" resulted in few, if any papers, on essentially every web site. However, papers on "Transportation" and "Physical Distribution" were plentiful. One site, Evil House of Cheat, produced 242 potential term papers for "Transportation." Several of the Paper Store sites, such as *fastpapers.com* and *paperstore.net* produced more than 440 potential papers with the search of "Physical Distribution." Unfortunately, their search engine lacks the ability to limit the search to papers with physical *and* distribution together. Rather, the search seeks all papers with physical *or* distribution. As a result of this flaw, the number of potential papers is inflated. An examination of the titles led to an estimate of 200 potential physical distribution papers. Only two sites contained any "Intermodal" papers. Six sites included papers on "Warehousing," but the availability ranged from only 1 to 19 papers.

The number of logistics papers is growing daily. The initial search of one site generated 96 potential papers combined for Logistics, Transportation, Physical Distribution, Intermodal, Warehousing, and Third Party Logistics Providers. A second search of the same site, conducted three weeks later, produced 108, a gain of 22 papers in three weeks or an average of 7 papers per week. This rapid increase in the supply of logistics-related papers reflects an increase in the demand for these topics.

Most of the paper mills advertise the high quality of their papers (i.e. *www.paper-writers.com* and *www.paperstore.net*). Many proclaim that their papers are written by professionals (i.e., *www.papershighway.com*) while others imply that their research is written by professors (i.e., *www.igradu8.com*). For example, *papersinn.com* claims they have "the highest quality papers." *Papershighway.com* states "our writers and researchers each possess an M.A. or Ph.D. in their field of specialization." Some sites name their businesses in such a manner that one might assume the papers are written, or at least supervised, by professors. For example, Professor John Siliati's web site is named The Doctor. A May 16, 2000 access of the site was the 995,475th time "The Doctor" page had been hit. Another site is named "Dr. G's IGRADU8."

Even if the quality of the paper is assured, students receive no guarantee that a paper is up to date unless they purchase a custom term paper. In fact, the newest pre-written transportation paper found at A1-termpaper.com was written in 1984. Other papers were as old as 1978. In other words, if students aren't careful, they may purchase a paper more than three decades old.

The quality of many of these papers is questionable at best. *U.S. News* recently recruited a student to purchase two custom papers from four online paper mills. Three out of four of the custom papers arrived on time but one of the online paper mills posted the purchased paper on their site and made it available to other students at a greatly reduced price. The "quality turned out to be a crapshoot" (Kleiner, Lord, and Faber 1999, p. 63).

The quality of custom papers can vary according to the time of the semester or year. One professional term paper writer calls herself "an academic call girl" (Witherspoon 1995). Witherspoon suggests that the caliber of the paper depends on the author's reason for writing custom papers, the level of expertise of the writers, and the peak times of the academic year. So, if a student orders a custom paper early in the semester he may receive a top quality research paper; but, if he orders one within the last few weeks of any given semester, when a large number of term papers are due, then the student may receive research of marginal or less than desired quality.

Witherspoon (1995) also states that a "professional" writer's expertise may expand based on their need for income rather than their education or training. In such cases, students are not only losing the educational value of writing the paper, but they can also lose substantial sums of money on an inferior effort on the part of the author(s).

MINIMIZING OR ELIMINATING CYBERCHEATING

The results of the current study indicate that the availability of logistics term papers via the Internet will be a growing concern. How can logistics professors stay a step ahead of their students and suppress the use of such services and the incidence of cybercheating?

Professors who require written papers are typically aware of the potential plagiarism problems and may have developed measures to counteract the problem. These measures can be adapted to also control instances of cyber-cheating.

Students use search engines and "dot.coms" as a pipeline to resource materials. The same search engines students use to find papers can be used by professors to identify sources of electronic plagiarism. Professors also have a unique set of "COMs" available to suppress the use of the "dot.coms." However, these specific "COMs" are found through Communication, Originality, and Motivation rather than through the Internet.

Communication

Students have a tendency to work toward their professor's expectations. Goal setting theory indicates that people tend to be more motivated to attain goals when the goals are difficult (Tubbs 1986). The combination of these two ideas indicates students tend to perform better for professors who expect more. Therefore, professors should communicate high expectations throughout the semester. The course can be structured in a manner to facilitate communication at critical times during the semester.

1. Begin the course with a syllabus that contains a well defined explanation of cheating, including the specifics of plagiarism and copying from the Internet. Some students believe that copying and pasting from the Internet is not cheating because everyone has easy access to the same information.

2. Provide students with specific formatting guidelines. Professors can reduce the potential for plagiarism by developing a structure for all term papers and providing students with a copy of the grading sheet when the paper is assigned rather than waiting until the paper is graded.

3. Require project progress reports and provide students with feedback for each report. When the professor provides feedback, students know he/she has read the material so they will at least think twice before representing someone else's work as their own.

4. Stress the old adage "cite site, write right." If students are required to properly cite sources and turn in copies of those sources to the professor then they will pay more attention to appropriate citations because they know the professor has access to their information.

Originality

The easiest thing for professors to do when making a project assignment is to use one previously developed or a project with very broad terms to allow students flexibility in their approach to the subject. Both of these practices open the door to potential cheaters. Rather than using one of these approaches, professors need to be creative.

1. Avoid using the same assignment from semester to semester. Change the paper topic, format, and guidelines periodically and make the topics specific. Professors may consider having students focus on some unique aspect of the topic that the professor covers in class.

2. Include a dimension in the project that requires students to make decisions about something in the project rather than just reporting on a topic. In addition to reducing the probability of plagiarism in the report, students will get an added bonus in the knowledge they gain from the critical thinking challenge.

Motivation

Goal setting theory indicates that people are motivated by goals that are difficult but not impossible to meet (Tubbs 1986). One might assume that students are motivated to meet their professors' expectations when they believe the expectations are attainable even if they are difficult. Professors can take several measures to facilitate this belief.

1. Assign the project early in the semester and require interim submissions during the semester. This will force students to begin the project early, thereby reducing the time pressures that tempt students to purchase research from the term paper mills. In addition, the professor will become familiar with students' writing styles, which will make identification of plagiarism easier.

2. Make arrangements for the class as a whole to meet with the reference librarian for guidance on finding the research information. Reference librarians are usually more than willing to show students how to properly use the information available. Many times they will adapt the information to the project if the professor provides a copy of the guidelines before the meeting.

Many students use the "dot.coms" to obtain term papers but professors can use the above unique set of "COMs" to help suppress this. In addition, professors need to monitor the online term paper mills for new submissions. These measures are particularly important for logistics professors because online logistics papers are in their infancy and availability is growing rapidly.

CONCLUSION

The information presented in this paper suggests academic dishonesty is widespread. The limited number of papers found indicates that purchasing logistics papers from the Internet is not prevalent at this point. However, the potential for future problems exists. Research indicates college students spend a significant amount of time on the Internet. Pre-college aged students spend much more time on the Internet and usage is increasing. As these students enter colleges and universities, the likelihood of increased cybercheating will also increase.

The probability of eliminating cheating and plagiarism is low, so logistics faculty need to "stay one screen dump ahead of their students" (Mercuri 1998, p. 136). The above set of suggestions will not eliminate the problem but can help faculty minimize the potential for cheating and plagiarism. One comforting fact that emerged through the research is that logistics term papers are not as readily available on the free sites as many other topics. Therefore, logistics students who use term paper mills for plagiarism will probably pay for their acquisition, if not through penalties for cheating, at least through the wallet. The number of available logistics term papers is increasing

daily, so more should be found on the free sites in the future.

The caliber of term papers available online is not consistent. However, the concern is not the quality of what students purchase. Rather, the issue is that students are being deprived of the knowledge and satisfaction that arise from successfully completing one's own assignments. If professors give students ample time to complete projects and make themselves available to help guide students when necessary, students will be encouraged to conduct the research on their own and gain the academic experience their professors want them to have.

REFERENCES

12,000 Papers (2000) [accessed April 24, 2000], Available from http://www.12,000papers.com.

Accepted Papers (2000) [accessed May 16, 2000], Available from http://www.acceptedpapers.com.

Aunapu, Greg (1996), "Term-Paper Capers," *People Weekly*, (September 26): 40.

Baird, J.S. Jr. (1980), "Current Trends in College Cheating," *Psychology in the Schools* (17):515-522.

Basinger, Julianne and Kelly McCollum (1997), "Boston U. Sues Companies for Selling Term Papers Over the Internet," *Chronicle of Higher Education* 44 (10):A34-A35.

Bertagnoli, Lisa (1997), "Cheating, Internet Style," *The Simpsonian*, (September 25), http://www.simpson.edu/~thesimp/archives/092597/cheating.html.

Big Nerds (2000) [accessed May 16, 2000], Available from http://www.bignerds.com.

Bivens, Teel, and Kenny Sahr (1997), "Click Here to Cheat," *Time Digital Supplement*, November 3, http://marse.galib.ugs.edu:4000/QUERY:fc...ntityNewArticle=1:next=html/Article.html.

Brown, Bob S. (1995), "The Academic Ethics of Graduate Business Students: A Study," *Journal of Education for Business* (January/February):151-155.

Bruinius, Harry, and Mark Clayton (1999), "School Cheating Up as Stakes Rise," *Christian Science Monitor*, (December 14): 1.

Bushweller, Kevin (1999), "Student Cheating: A Morality Moratorium?" *The American School Board Journal* 186 (April):24-32.

Campbell, Constance R., Cathy Owens Swift, and Luther (Trey) Denton (2000), "Cheating Goes Hi-Tech: Online Term Paper Mills" *Journal of Management Education* Forthcoming.

Cheaters (2000) [accessed April 24, 2000], Available from http://www.cheaters.com.

Chuck III (2000), [accessed May 16, 2000]. Available from http://www.chuckiii.com/topsites/index.shtml.

Clayton, Mark (1997), *Term Papers at the Click of a Mouse* (October 27) 1997 [cited December 10 1997]. Available from http://www.cs-monitor.com/durable/1997/10/27/feat/learning.1.html.

Cross, Kim (1999), "B-to-B, By the Numbers," *Business 2.0*, (September): 109,111,120.

Crown, Deborah F., and M. Shane Spiller (1998), "Learning from the Literature on College Cheating: A Review of Empirical Research," *Journal of Business Ethics* 17 (6 (Part 2)):683-700.

The Doctor (2000), [accessed May 16, 2000]. Available from http://members.tripod.com/~Termpapers/index.html.

Dr. G's IGRADU8 (2000), [accessed May 16, 2000]. Available from http://www.igradu8.com.

Essay Crawler, [accessed May 16, 2000]. Available from http://www.essaycrawler.com/t50/autorank.shtml.

Essay World (2000) [accessed May 16, 2000], Available from http://www.essayworld.com.

Fast Papers (2000) [accessed April 24, 2000], Available from http://www.fastpapers.com.

Free Essays (2000), [accessed April 24, 2000]. Available from http://www.freeessays.com.

Free Term Papers (2000) [accessed May 16, 2000], Available from http://www.free-term-papers.com.

Genius Papers (2000) [accessed April 24, 2000], Available from http://www.geniuspapers.com.

Glasner, J. (1997), "Boston University Sues Internet Term Paper Retailers," *Journal Law EXTRA!*, [accessed December 11 1997]. Available from http://www.ljx.com/LJXfiles/busues.html.

Hawley, C. (1984), "The Thieves of Academe: Plagiarism in the University System," *Improving College and University Teaching* (32):35-39.

Kerkvliet, Joe, and Charles L. Sigmund (1999), "Can We Control Cheating in the Classroom?" *Journal of Economic Education* (Fall):331-343.

Kleiner, Carolyn, Mary Lord, and Lindsay Faber (1999), "The Great Term-Paper Buying Caper," *U.S. News & World Report*, (November 22): 63.

Lord-X's Free Papers (2000) [accessed April 24, 2000], Available from http://www.geocities.com/college Park/Library/9044.

Macavinta, C. (1998), "College Sues Term Paper Sites," *The Net* [accessed June 10 1998]. Available from http://www.news.com/News/Item/ 0%2C4%2C15495%2C00.html.

Macavinta, C. (1998), "Texas, College Go After Cheaters," *The Net* [accessed June 10 1998]. Available from http://www.news.com/News/Item/0.4.13004.00.html.

Machlis, Sharon (1997), "University Sues Over Internet Term-paper Sites," *Computerworld*, (October 27): 3.

McCabe, D.L., and L.K. Trevino (1995), "Cheating Among Business Students: A Challenge for Business Leaders and Educators," *Journal of Management Education* 19:205-218.

Mercuri, Rebecca (1998), "In Search of Academic Integrity," *Communications of the ACM* 41 (5):136.

Net Essays (2000), [accessed May 16, 2000]. Available from http://www.netessays.net/top25/rankem.html.

Paper Camp (2000) [accessed May 16, 2000], Available from http://www.papercamp.com.

Paper Store (2000) [accessed April 24, 2000], Available from http://www.paperstore.net.

Paper Writers (2000) [accessed May 16, 2000], Available from http://www.paperwriters.com.

Planet Papers (2000) [accessed May 16, 2000], Available from http://www.planetpapers.com.

Rao, Nita. (1999), "Paper Trail," *The Village Voice*, April 20, 35-36.

Roach, Ronald (1998), "High-Tech Cheating," *Black Issues in Higher Education* 15 (22):26-27.

Sawhney, Mohanbir and Steven Kaplan (1999), "Let's Get Vertical," *Business 2.0* (September): 85-89.

School Sucks (2000) [accessed April 24, 2000], Available from http://www.schoolsucks.com.

Sims, Randi L. (1993), "The Relationship Between Academic Dishonesty and Unethical Business Practices," *Journal of Education for Business* (March/April):207-211.

Swift, Cathy Owens, and Sarath Nonis (1998), "When No One is Watching," *Marketing Education Review* 8 (1):27-38.

Tom, Gail, and Norm Borin (1988), "Cheating in Academe," *Journal of Education for Business* (January):153-157.

Trustees of Boston University v. Professor Abe Korn (1997), No. 97-CV-12365-PBS October 20, Available from http://jmls.edu/cyber/cases/bu-term1.html

Trustees of Boston University v. ASM Communications (1998), Available from http://jmls.edu/cyber/cases/

Tubb, Mark E. (1986), "Goal Setting: A Meta-Analytic Examination of the Empirical Evidence," *Journal of Applied Psychology*, (August): 474-483.

Witherspoon, Abigail (1995), "This Pen for Hire," *Harper's*, (June): 49-57.

AUTHOR BIOGRAPHY

Kathleen H. Gruben (BBA and MBA Stephen F. Austin State University and Ph.D. University of North Texas) is assistant professor of marketing at Georgia Southern University. She has previously published in the *Journal of Managerial Issues* and numerous national and regional proceedings. She is very active in several marketing associations such as the Academy of Marketing Science, American Marketing Association, Association of Marketing Theory and Practice, and Society for Marketing Advances among others. Her research interests are in the areas of retailing, advertising, and relationship marketing.

AUTHOR BIOGRAPHY

Cathy Owens Swift (BS Pennsylvania State University, MBA Indiana University, Ph.D. University of North Texas) is professor of marketing at Georgia Southern University. She has published in the *Journal of the Academy of Marketing Science*, the *Journal of Business Research*, the *Journal of Personal Selling and Sales Management*, *Industrial Marketing Management*, the *Journal of Business and Industrial Marketing*, the *Journal of Marketing Education*, the *Journal of Education for Business*, *Marketing Education Review*, and numerous national and regional proceedings. Her research interests are in the area of sales management, international marketing and marketing pedagogy.

AUTHOR BIOGRAPHY

Luther (Trey) Denton (BA and MBA Emory University and Ph.D. University of Georgia) is associate professor of marketing at Georgia Southern University. He has previously published in the *International Journal of Commerce and Management*, the *Journal of International Consumer Marketing*, the *Journal of Management*, *Marketing Education Review*, the *Journal of Professional Services Marketing*, the *International Journal of Bank Marketing*, the *Journal of Marketing Education*, the *Journal of International Food and Agribusiness Marketing*, and the *Thunderbird International Business Review* and numerous national and regional proceedings. His general research interests are in marketing education and international marketing, with particular focus on Asia.

THE USAGE OF MOBILE COMMUNICATION SYSTEMS IN THE TRUCKING INDUSTRY

R. Stephen Parker
Southwest Missouri State University

John L. Kent
Southwest Missouri State University

Karl B. Manrodt
Georgia Southern University

ABSTRACT

This article reports the findings of a mobile communications survey mailed out to over 2,000 trucking firms. The findings indicate that 68% of respondents use some form of mobile communication system in their firm. Various types of mobile communication systems were reported, including two-way pagers, one-way pagers, cell phones, two-way radio, and satellite communications. Additionally, implementation decision factors for mobile communication systems were evaluated for both users and non-users of mobile communication systems.

INTRODUCTION

Just-In-Time (JIT), Quick Response (QR), and Efficient Customer Response (ECR) are a few of the logistics strategies that manufacturers and retailers have embraced that frequently require tracking a shipment to determine its location on a moment's notice. Traditionally, complete, timely, and accurate tracking information simply have not been available for shipments as they flow through the supply chain. Common transportation-related events such as departed-from-shipper, en-route status, and arrival-at-consignee have relied upon a phone call from a truck driver to their dispatcher as the trigger for valuable shipment information to be captured and entered into the information flow required by the supply-chain. The result has been waits of two or more days for matches to be made between the trucker and the required paper work, resulting in a $5 billion drain in business (Spencer, 2000). However, electronic data interchange (EDI) plays a critical role in supply chain management by improving vendor responsiveness and flexibility, thereby improving relationships and improving carrier operational planning and performance (Crum, 1998). Dadzie, et. al (1999) suggest that the integration of new technologies (EDI) into the logistics supply chain allows for higher levels of customer service, as

well as giving management a new method for reducing overall costs.

Kavalaris and Sinha (1995) report that, as recently as 1993, most trucking companies were not using advanced mobile communications technology and the majority of firms were not aware of advances in toll collection, weigh station bypass, and vehicle identification devices. Indeed, as recently as 1999, Regan and Golob reported that, while many vehicles are equipped with two-way communication devices, they are not typically equipped with vehicle location or identification devices. However, a technological revolution within the truck-load (TL) segment of the transportation industry has been evolving over the past decade which has extended the real-time information gathering and communication capabilities directly into the cabs of many over-the-road trucks in America. This assertion is supported by Crum, Johnson, and Allen (1998) who report that the use of EDI technologies increased significantly between 1990 and 1996. This technology, frequently referred to as mobile, wireless, or satellite communications, provides bi-directional data and, in some cases, voice communications capabilities between the truck and their dispatch office computer systems. Interestingly, this same technology may serve the less-than-truckload (LTL) segment of the motor carrier industry equally as well. The LTL segment tends to experience even greater operating problems, which may be even more complex than the TL segments of the industry (Crum, Johnson, and Allen 1998).

The three primary vendor-based justifications for the implementation of mobile communications technology have been: 1) improved customer service, 2) improved operational efficiencies, and 3) improved driver quality of work life. Not a week goes by without several articles or advertisements in the major trucking publications referring to mobile communications in the form of pagers, cellular phones, and satellite global positioning systems (GPS). However, even though these justifications are intuitively valid and important, little academic research has yet been conducted that fully explores the relationship between them and the actual implementation of mobile communications within a fleet operations.

The primary purpose of this research was to understand the level of implementation of mobile communications within the trucking industry. Additionally, decision factors in the buying process for both users and non-users of mobile communication systems were investigated.

LITERATURE REVIEW

There is no doubt that there has been an ongoing communication revolution in the trucking industry which has included technical advances in two-way radios, pagers, cellular phones, wireless data communications, and vehicle tracking systems (Bald, 1995). In fact, by 1995, advancements in these areas had made the transportation industry the single largest user of wireless data services in the United States with a 34 percent share of the wireless market resulting in increases in customer satisfaction, improved delivery, improved information systems and more accurate vehicle tracking (Dollar, 1995).

Communication in the trucking industry is continuing to evolve as improved technology has become available. Johnson (1999) observes that the 1950's saw the introduction of the CB radio. While popular with ham radio operators, the CB did not become popular with truckers until 1974, and then primarily as an aid to find fuel during the oil embargo. However, twenty years later CB radios were being used by approximately 99 percent of all heavy trucks on the highway as a common form of communication between drivers (Bald, 1995). Communication from truck-to-truck is one thing but, communication from a company's dispatcher to the truck operator is quite another problem which was yet to be completely solved.

Pagers provided dispatchers with a relatively low cost method of reaching drivers. As a result, the growth rate of pager usage was about 5 million

per year in 1995 (Bald, 1995). However, while pagers provided an improved method of communicating with drivers from much longer distances than CB radios, the communication was one-way (dispatcher to operator) and drivers were forced to stop and find a phone if they wished to communicate directly with their dispatchers. Johnson (1999) reports that the solution to the short range problems associated with CB's and the one-way communication problem associated with pagers came in 1969 with the introduction of cell phone service in the form of Improved Mobile Telephone Service. This product was replaced in 1979 with Bells' Advanced Mobile Phone Service.

There is no doubt that cellular usage is still popular. In fact, United Parcel Service is reported to make about 1 million calls and uploads data on 6 million packages per day (Dollar, 1995). However, even with the popularity of cellular usage, the 1980s and 1990s have witnessed the introduction of widespread computer usage and satellite tracking systems which have dramatically changed communication in the trucking industry. Internet systems now exist that allow truckers web access at truck stops where they can log on to web cites to obtain information from their dispatchers. To date, PNV (formerly Park-in-View) has introduced services to over two-thirds of all full-service truck stops which allows the driver to hook up to phone lines, the internet or even cable TV (Spencer, 2000). Spencer further notes, however, that only four percent of drivers and trucking companies are taking advantage of these services. The companies must also educate truckers, of which only 20 percent own a PC, of the advantages of these services.

Qualcomm, Incorporated was the first company to successfully introduce this type of technology in 1988. Since that time, Qualcomm systems have been adopted by more than 1,000 trucking fleets in North America, including 37 of the top 40 trucking companies (Marchetti, 2000). In fact, by 1995 they had equipped 106,000 trucks with new satellite tracking technology (Bald, 1995) and the number of units in use continued to increase to 250,000 by 1999 (Allen, 1999). Also in 1999, the Federal Communications Commission approved increasing the number of units from 250,000 to 400,600 (Whitten, 1999). This type of continued increase in satellite tracking tends to support Munson's (1999) assertion that satellite tracking of fleets is rapidly becoming a standard practice in the trucking industry.

Munson further notes that this technology has been expanded into other areas and is now being used not only as a method to communicate with drivers and track their positions, but also to perform engine diagnosis while the truck is on the road, receive real-time data on the truck's engine, schedule preventive maintenance, and track parts and labor costs per vehicle. Even though this technology has dramatically improved the ability to track positions of a fleet, some problems do still exist. Milligan (1999) reports that the typical tracking systems are generally attached to the tractor, as it has a source of power to run the unit, and when the tractor is separated from the trailer the system will lose track of the trailer resulting in a wide variety of inventory control and handling problems.

Presently, a wide variety of satellite tracking systems are available to the trucking industry including systems from @Track Communications (formerly HighwayMaster), Rockwell Highway Transport Electronics, Cadec Systems, Airtouch Teletrac (Bald, 1995), Arinc, Orbcomm, PeopleNet, and Vantage (Fleet Equipment, 1999). While each of these systems tend to differ slightly, they are all designed to help pinpoint the location of a particular tractor or trailer.

METHODOLOGY

The research methodology incorporated a self-response survey instrument that was developed in coordination with Qualcomm, Incorporated, a leading mobile communications provider for the trucking industry. The questionnaire was designed to investigate both current users and non-users of mobile communication technology.

The survey was pre-tested for content and readability based on feedback from a small sample of trucking companies and Qualcomm. An introductory letter, the survey, and a postage paid return envelope were then mailed to a sample of 2,736 trucking companies asking for their participation in this study. In an effort to avoid the possibility of bias, the research sponsor was not identified in either the cover letter or questionnaire.

Non-respondents to the initial survey mailing were sent a follow-up postcard approximately ten days later. At the end of the collection period, twenty-four (24) surveys were returned undeliverable along with 565 completed surveys thus providing a response rate of 21 percent (565/2,736-24). Non-response bias was evaluated by comparing earlier responses to later responses for nine of the Likert scaled questions (Armstrong, 1977). No statistically significant differences were found from the comparisons. Therefore, non-response bias was not considered to be a problem.

FINDINGS

The first section of the questionnaire examined if the responding company used some form of mobile communications and, if so, what types of systems were presently being used in their fleets. Of the 563 companies responding to the question, "Does your company currently use mobile communications," 384 (approximately 68 percent) indicated that their company does use some form of mobile communication, while 179 (approximately 32 percent) of the companies responded that they did not presently use mobile communications systems within their fleet. Two respondents did not answer this question. Table 1 shows the type of mobile communication systems currently being used by the respondent companies. Note that some companies indicated the use of more than one type of mobile communication system in their fleet.

Table 1 clearly shows that, while a variety of systems are being used, two-way pagers receive the least usage. The most popular forms of communication, in descending order are cell phones, satellite systems, one-way pagers, and two-way radios.

TABLE 1
TYPE OF COMMUNICATION SYSTEM

System Type	Number/Percent Using	
Two-Way Pagers	37	9.6%
One-Way Pagers	165	43.0%
Cell Phones	226	58.8%
Two-Way Radio	121	31.5%
Satellite	183	47.7%

Note that respondents were asked to check all that applied. Therefore, some companies indicated the use of more than one type of mobile communication system in their fleets.

During the development stage of the questionnaire several decision factors were identified that could be used in deciding whether or not to purchase a mobile communications system. Table 2 shows those decision factors and the level of importance that companies reported for each factor regarding their implementation of mobile communication in the fleet.

Table 2 shows the mean level of importance that the respondents reported for each decision factor with 1 representing "not very important" and 7 representing "very important." The least important decision factor as reported by the respondents was the use of a mobile communications system by a competitor with a mean response of 3.87. Another relatively unimportant decision factor was the anticipation that, by using some form of mobile communication system they might increase their own customer base, with a mean response of 4.35. However, the level of importance associated with each of the remaining decision factors appears to be relatively high. The highest level of

TABLE 2
DECISION FACTOR IMPORTANCE

Decision Factors	Mean Importance Level
Ability to contact driver immediately	6.25
Ability to track shipments	5.66
Operating Efficiency	5.62
Enhance Customer Service	5.52
Driver Quality of Life	5.07
Customer requires mobile communication	4.96
Increase customer base	4.35
Competitors use mobile communication	3.87

1 = "Not Very Important" – 7 = "Very Important"

importance (6.25) clearly rests in the ability of the dispatcher to be in immediate contact with the driver. Other factors scoring relatively high were the ability to track shipments (5.66), operating efficiency (5.62), and enhancing customer service (5.52).

As noted earlier, non-mobile communication users were asked a series of questions to determine why they have chosen not to invest in this type of technology. The responses to these questions are shown in Table 3.

Responses were based upon whether the respondents found the criteria to be of low importance, medium importance, or high importance in their decision **not** to purchase mobile communication equipment. The factor rated as highest in importance for **not** purchasing a mobile communication system was "routes don't need mobile communication" (rated high importance by 23.9 percent and medium importance by 14.8 percent of respondents). The second highest rated factor for **not** purchasing a mobile communication system was "cost of hardware and implementation" (rated as high importance by 12.8 percent and medium importance by 29.1 percent of respondents). Additionally, the "cost of monthly service" also received medium importance ratings from 23.0 percent of respondents which shows some concern for cost.

TABLE 3
FACTORS AFFECTING NON-USE OF MOBILE COMMUNICATIONS

Factor	Low Impt (%)	Med Impt (%)	High Impt (%)
Other Critical IT initiatives underway	93.3	3.3	3.3
Customers don't require mobile communication	78.3	16.9	4.8
Fleet size is too small	73.2	19.6	7.1
Cost of monthly service	77.0	23.0	0.0
Routes don't need mobile communication	61.9	14.8	23.9
Cost of hardware and implementation	58.2	29.1	12.8

However, the wide range of responses indicates that no single factor was found to be rated of particularly high importance in the decision **not** to purchase a mobile communication system. These findings appear to be similar to those of Hall and Intihar (1997) who reported that trucking companies are willing to invest in new technologies as long as the costs are low and there are no new taxes or user fees involved. Scapinakis and Garrison (1991) reported that short distance operators are heavy users of communication technologies but it is long distance carriers that are most likely to require both communication and vehicle location systems. Regan and Golob (1999) also reported that large fleets are more likely to use technologies than small fleets. As might be expected from the literature, the results of this study demonstrate that companies running regular short routes see little need for the implementation of any type of sophisticated vehicle location systems.

DISCUSSION

The results of this study rather clearly support the assertion that mobile communications systems are becoming more commonly used in the trucking industry. Indeed, these systems appear to be more sophisticated than the simple one-way pagers of the past. The use of cell phones and satellite systems were the most commonly mentioned types of systems being used. The primary reasons for continued growth in the use of mobile communication systems appear to be based on both the effectiveness and efficiency provided to the fleets implementing these systems. On the effectiveness side of the value equation, the ability of a trucking firm to be in immediate contact with a driver and track shipments clearly allows the company flexibility that was not available when the dispatcher was forced to wait for a driver to find a truck stop and check in by phone. On the efficiency side of the value equation, operational efficiencies like the ability of a trucking firm to better manage out-of-route miles and manage more drivers per driver manager are important cost benefits of a mobile communication system.

As noted earlier, the ability of a transportation firm to be able to immediately tell a shipper where their shipment is at any given time provides that firm with a competitive advantage over trucking firms who have chosen not to invest in mobile communication systems. There can also be little doubt that the operational efficiencies provided by this type system will help keep inflation down in transportation prices, providing an additional competitive weapon for the fleets implementing the systems.

The ability for a maintenance manager to be in constant contact with a driver is an obvious advantage in terms of vehicle maintenance and providing immediate help in case of a breakdown or other emergencies. The ability of dispatchers to both know exactly where a shipment is and be able to talk directly with a driver about present and expected conditions will undoubtedly serve as a tool for increasing customer satisfaction and profits.

While there appeared to be no one specific reason for companies not to invest in mobile communications systems, cost of the hardware and implementation of the system along with the monthly service fees did appear as significant contributing factors for non-users of these types of systems. If these systems prove to be as effective as they appear to be, the fear of investment cost may put the non-using company at a true competitive disadvantage. Those respondents indicating that mobile communications were not a necessity for their fleets, as a result of routes being relatively short, may find that these shipments are every bit as important to buyers as those loads traveling long distances and the ability to be able to locate the shipment and advise the buyer as to arrival time may be the characteristic that sets them apart from their competitors.

Further research in this area is clearly needed. For example, a comparison of perceptions that fleet managers held prior to the implementation of a mobile communications system to perceptions after the implementation of the system could be of significant value to those companies using the systems, those considering implementation of a system, and to those companies providing the systems to the industry.

REFERENCES

Allen, M. (1999). "Shifting Gears at Highway Master," *Dallas Business Journal*, 22 (22 January 22-28): p1, 2p, 1c.

Armstrong, S. J. and Overton, T. J. (1977). "Estimating Non-Response Bias in Mail Surveys," *Journal of Marketing Research*, (August): 396-402.

Bald, J. (1995). "A Communications Revolution," *Overdrive*, 35 (3, March): 64-68, 120-123.

Crum, M. R., D. A. Johnson, and B. J. Allen (1998). "A Longitudinal Assessment of EDI Use in the U.S. Motor Carrier Industry," *Transportation Journal*, 38 (1, December 22): 15-28.

Dadzie, K. Q., W. J. Johnston, E. W. Dadzie, and B. Yoo (1999). "Influence in the Organizational Buying Center and Logistics Automation Technology Adoption," *The Journal of Business & Industrial Marketing*, 14 (5/6): 433-444.

Dollar, T. (1995). "A World Without Wires," *Distribution*, 94 (10): 59-62.

Fleet Equipment (1999). "Mobile Communications—A Look Ahead," *Business Management*, 25 (5, May): 3.

Hall R. W. and C. Intihar (1997). "Commercial Vehicle Operations: Government Interfaces and Intelligent Transportation Systems," *California PATH Research Report, UCB-ITS-PRR-97-12*: Institute of Transportation Studies, University of California, Berkeley.

Johnson, S. (1999). "Communication Revolution," *Overdrive*, 39 (1, January): 118.

Kavalaris J. G. and K. C. Sinha (1995). "Intelligent Vehicle Highway System Commercial Vehicle Operations Perceptions, Needs, and Concerns of Indiana-based Motor Carriers," *Transportation Research Record*, (1511).

Marchetti, M. (2000). "Qualcomm's Road Show," *Sales & Sales Management*, 152 (5): 90-100.

Milligan, B. (1999). "High-Tech Tools: Boon for Shippers & Carriers," *Purchasing*, 127 (2, August 12): 103-108.

Munson, P. (1999). "Technology Has Brought the Trucking Industry Everything From Satellite Tracking to Maintenance Software," *Focus*, 29 (13, September 20): 9.

Regan, A. C. and T. F. Golob (1999). "Freight Operators' Perceptions of Congestion Problems and Application of Advanced Technologies: Results from a 1998 Survey of 1200 Companies Operating in California," *Transportation Journal*, 38 (3, Spring): 57-67.

Scapinakis, D. A. and W. L. Garrison (1991). "Communications and Positions Systems in the Motor Carrier Industry," *PATH Research Report, UCB-ITS-PRR-91-10*: Institute of Transportation Studies, University of California, Berkeley.

Spencer, T. (2000). "Plug in, Turn on, and Roll out," *Fortune*, 141 (10, May 15): 471- 472.

Whitten, D. L. (1999). "Qualcomm Set to Expand into Urban Trucking Markets," *Transport Topics*, (November 8): 4, 69.

AUTHOR BIOGRAPHY

R. Stephen Parker (DBA, Louisiana Tech University) is a professor of marketing at Southwest Missouri State University. His articles have appeared in such publications as the *Journal of Advertising Research*, *Industrial Marketing Management*, the *Logistics and Transportation Review*, *Management Accounting*, *Review of Business*, and the *Marketing Education Review*.

AUTHOR BIOGRAPHY

John L. Kent (Ph.D., University of Tennessee) is an assistant professor of logistics at Southwest Missouri State University. His interests include the investigation of the effect of information technology on a retail supply chain, international transportation, and mobile communications. Dr. Kent has previously published in the *International Journal of Physical Distribution and Logistics Management*, the *Journal of Business Logistics*, the *Defense Transportation Journal*, the *Journal of Marketing Management*, and conference proceedings of the Academy of Marketing Science, Council of Logistics Management, and Intermodal Distribution Education Academy.

AUTHOR BIOGRAPHY

Karl B. Manrodt (Ph.D., University of Tennessee), is an assistant professor of logistics at Georgia Southern University. His interests include performance measurement, forecasting, mobile communications, and the role of information technology on the supply chain. Dr. Manrodt has coauthored two books, and his research has appeared in the *International Journal of Physical Distribution and Logistics Management*, the *Journal of Business Logistics*, the *Transportation Journal*, and conference proceedings of Council of Logistics Management and WERC.

TERRORISM AND THE GLOBAL SUPPLY CHAIN: WHERE ARE YOUR WEAK LINKS?

Kathryn Dobie
North Carolina A&T State University

L. Milton Glisson
North Carolina A&T State University

James Grant
American University at Sharjah, United Arab Emirates

ABSTRACT

For many years, managers have chosen to ignore the risks associated with acts of terrorism that can potentially and catastrophically affect the global supply chain. As producers and suppliers become more tightly tied through long term relationships, common communications and information technology, events affecting one member of the supply chain can have a profound impact on the ability of the rest of the network to operate. The purpose of this discourse is to highlight the linkages which leave a supply chain vulnerable in the case of direct or indirect disruption caused by unexpected terrorist activity.

Headlines proclaim **"Despite Demonstrations and Terrorism Fears, Commerce Continues"** (Pope 2000). For how long? What now? Is **your** supply chain vulnerable to disruptions due to terrorist activity? What kinds of terrorist activities are likely to disrupt supply chain operations?

Many in the United States have long considered terrorism as something that happens somewhere else to someone else. To a great extent that belief has been supported. Recent terrorist activity in the U.S. has been confined to a few high profile cases such as the Atlanta, Oklahoma City, and World Trade Center bombings. Many have chosen to forget the events that occurred domestically and world-wide during the Viet Nam War. However, Stephen W. Brooks of the Treasury Department, a leading expert on anti-terrorist training and planning, has commented that he expects the number of terrorist attacks in the U.S. to increase (Fabey 1998). Even more frightening is the observation that terrorists can take as much time as necessary to determine the appropriate target and make plans for the attack. Weapons, whether some form of firearm or the more difficult to detect biological variety, are easily obtained on the street or through the Internet.

According to Brooks, businesses, especially big companies doing business with the government, have become a primary target. Raids on some terrorist groups have revealed plans for attacks on ports, rails, and other transportation facilities and networks. Such attacks would provide high visibility and extensive disruption, furthering the objectives of the terrorist group. The reality of such threats prompted President Clinton to declare war on terrorism. The maritime community, with a long history of dealing with terrorist activity in the form of pirates, hijackers, and smugglers, has expressed a growing concern that it is only a matter of time before a port, ship, or related facility becomes a target of a terrorist attack.

In view of the mounting level of concern regarding the potential for disruption of private and business activity by terrorist activity, the question that may be asked is whether reality supports that concern (Patterns of Global Terrorism 1999). During the years 1994 through 1999, statistics substantiate the concerns expressed regarding terrorist activity (Table 1).

A review of these statistics reveals that businesses, targeted 1,589 times during this five-year period, **are** subject to terrorist attacks in far greater numbers than any other category.

While there are undoubtedly many explanations for the targeting of any given business, the question for transportation and logistics professionals is, "What effect will this have on my company as we seek to meet strategic and customer service objectives," followed closely by, "What can be done to reduce the potential vulnerability in the supply chain?"

PREVIOUS RESEARCH

In an attempt to develop an understanding of the potential points of vulnerability in the supply chain it is necessary to examine both the logistical functions within the firm and

TABLE 1
TOTAL FACILITIES STRUCK BY INTERNATIONAL TERRORIST ATTACKS: 1994-1999

Year	Business	Diplomatic	Government	Military	Other
1994	130	24	27	5	126
1995	338	22	20	4	126
1996	236	24	12	6	90
1997	327	30	11	4	80
1998	282	35	10	4	67
1999	276	59	27	17	95
Total	**1,589**	**194**	**107**	**40**	**584**

Adapted from:_____, "Patterns of Global Terrorism 1999," Department of State Publication 10678, Office of the Secretary of State, Office of the Coordinator for Counterterrorism, April 2000, Appendix C Statistical Review, p. 104.

throughout the supply chain. Previous studies have investigated various aspects of the supply chain related to the most efficient operational considerations when moving revenue traffic (cargo and passengers). In one such study (Cavinato 1992), a model of twenty basic cost and value elements is developed which are used to define ten key strategic and management areas. Yet, not a single element in the list of twenty cost and value elements or the list of ten key strategic and management areas refers to the enormous costs, financial and human, that could result from terrorist activities directed toward the firm or the environment in which it operates.

A study conducted by Hsu and El-Najdawi (1991) examined the safety stock/lot sizing relationship. Results indicated that total production costs were determined by the number of set-ups, inventories carried, and the frequency of shortages that were the result of the lot size/safety stock relationship. Though it represents a fairly definitive study of four safety stock policies, it provides no reference to the implications of terrorism on safety stock policy decision making.

Modal selection and carrier choice criteria were the objectives of a study by Foster and Strasser (1990). Variables such as costs, transit time, negotiable rates, negotiable service, reliability, frequency of service, claims settlement, equipment availability, electronic data processing, quality of sales personnel, and warehousing capabilities were elements of importance to both carriers and shippers. However, elements such as vulnerability to terrorist activity were not mentioned by either carriers or shippers as being a consideration in the selection of carrier or mode. In a related study, the selection of mode and port for international logistics was investigated. Neither vulnerability to terrorist activity nor contingency alternatives to continue port activities were mentioned as selection criteria (Min and Galle 1996).

The examination of routing and scheduling by Ronald Ballou (1990) did not take into consideration the effects of extraneous elements such as the probability of terrorist disruption. Instead the emphasis was restricted to the minimization of miles traveled and vehicles used when developing a methodology for routing and scheduling.

Kathleen Allen (1991) examined the role of logistics in the overseas plant selection process. This study examined the importance of corporate and/or environmental characteristics in executive's perceptions of the importance of logistics as overseas production facility acquisition was considered. While factors such as product type, revenue size, number of overseas production facilities, technological production sophistication, foreign market growth objectives, and the relative costs of distribution were considered, the probability of terrorist activity was not a factor for consideration.

The impact of inventory centralization was examined in an effort to determine the need to change the number of stocking locations based on the nature and magnitude of the uncertainty with which a firm is faced (Tallon 1993). Uncertainty in this research is restricted to demand uncertainty. No consideration is given to the need to reduce the uncertainty resulting from the probability of terrorist activity.

The importance of developing close vendor ties for the successful implementation of integrated logistics management and just-in-time inventory systems was the subject of a study by Thomas Harrington, et. al. (1991). In this study, a methodology for the evaluation of vendor performance was developed. This tool would be used by managers to formally evaluate vendors for the purpose of determining the most desirable vendors with which to develop long term relationships, identifying problems needing corrective action, and gaining productivity improvements. None of the criteria identified related to the impact of terrorist targeting of the supplier and/or its operating environment.

In addition to studies of the individual elements of logistics activity, studies of international logistics management such as that by Morgan

and Arnold (1991) have been conducted. Terrorism is not a topic of consideration in overall studies just as it has not been considered in studies focusing on individual elements of the logistics activity.

IMPACT ON SUPPLY CHAIN DESIGN AND COMPOSITION

No matter the product category, size, country of origin, or any number of other factors, firms of all descriptions are reaching out to markets in all parts of the world. As they reach into these arenas, the strength and reliability of the supply chain becomes of exponential importance. From Alexander the Great to Amazon.com, history is replete with examples of the impact of supply chain operations on the ability to accomplish planned strategic objectives.

Location

Location is a major element of supply chain design. From the determination of production facility and warehouse/distribution center location for maximum market coverage by shippers, to the determination of the most efficient location of terminal facilities and most direct route by carriers, location has always been one of the most important factors in the decision. Location is also an identifiable indicator of the probability of terrorist activity (Table 2).

From this table it can be seen that terrorist attacks are a fact of life in most parts of the world. It is important to remember that, like a stone tossed into a quiet lake, each attack creates a pattern of disruption that continues to be an issue even after the initial event. These

TABLE 2
INTERNATIONAL TERRORIST ATTACKS BY REGION
1994 - 1999

Year	Africa	Asia	Eurasia	Latin America	Middle East	North America	Western Europe
1994	25	24	11	58	116	0	88
1995	10	16	29	5	45	0	272
1996	11	11	24	84	45	0	121
1997	11	21	42	128	37	13	52
1998	21	49	14	111	31	0	48
1999	52	72	35	121	25	2	85
Total	**130**	**193**	**131**	**594**	**299**	**15**	**666**

Adapted from:_____, "Patterns of Global Terrorism 1999," Department of State Publication 10678, Office of the Secretary of State, Office of the Coordinator for Counterterrorism, April 2000, Appendix C Statistical Review, p. 102.

disruptions are related to the actual destruction of facilities and infrastructure as well as the continued fear of further attack which affects the behavior of those involved.

When taking an integrated supply chain perspective, location becomes even more of an issue. No longer is the element of risk restricted to the facilities and personnel under the direct control of the company. From the shipper's perspective, locational risk considerations include the location of suppliers (first, second, and even third tier), inventory storage and distribution center placement, carriers and carrier routes selection, and customer location.

Contingency Planning

Managers at all levels of the supply chain must face the reality of terrorist activity and its potential impact on supply chain operations. Partner selection must include an evaluation of the ability of that partner to perform, even in the event of terrorist generated disruption, just as they are expected to perform in the event of natural disasters and other unplanned events. However, unlike a natural disaster in which those affected are simply a matter of chance, terrorist activity is often specifically targeted (Table 3). This means that several links in the supply chain may be affected simultaneously, either directly as a result of the actual event, or indirectly as a result of facility/infrastructure destruction, or human casualties (Table 4).

The development of contingency plans is the responsibility of all members of the supply chain. Because of the need for integration, these plans must not only cover all aspects of firm operations communication links between the individual members. Just as the growth of ERP programs purports to more tightly tie supply chain members into an integrated information network, the vulnerability of all members of that network to IT sabotage is increased.

TABLE 3
ANTI-U.S. TERRORIST ATTACKS BY REGION
1999

Region	Number of Anti-US Attacks
Latin America	96
North America	1
Asia	6
Eurasia	9
Middle East	11
Africa	16
Western Europe	30
Total	**169**

Adapted from:_____, "Patterns of Global Terrorism 1999," Department of State Publication 10678, Office of the Secretary of State, Office of the Coordinator for Counterterrorism, April 2000, Appendix C Statistical Review, p. 106.

Note: Includes attacks against U.S. facilities and attacks in which U.S. citizens suffered casualties.

Impact of the Internet

The increased use of the Internet for commerce, whether consumer or business oriented, has had a tremendous impact on affected firms. Just as firms developed the logistics techniques necessary to implement JIT strategies, they must

TABLE 4
U.S. CASUALTIES INCURRED IN ANTI-U.S. TERRORIST ATTACKS 1999

Organization	Number of Casualties
Government	7
Military	9
Diplomat	9
Business	133
Other	26
Total	**184**

Adapted from:_____, "Patterns of Global Terrorism 1999," Department of State Publication 10678, Office of the Secretary of State, Office of the Coordinator for Counterterrorism, April 2000, Appendix C Statistical Review, p. 106.

Note: Includes attacks against U.S. facilities and attacks in which U.S. citizens suffered casualties.

now further refine those techniques to respond to an Internet-based operating environment. To be specific, JIT requirements of smaller, more frequent deliveries and shipments, have now become requirements for faster deliveries and shipments at the single-item level on a world-wide basis. This has entailed the development of multiple channels using carriers capable of handling smaller sized shipments with a global reach.

To accomplish this herculean task, carriers have formed international alliances, made increased investments in information technology, increased their use of the communication potential of the Web, and made greater use of faster transportation modes—specifically air. As shipments get smaller, and increased use is made of small package carriers, security becomes more of an issue. At this time, small package carriers are caught between the need to maintain shipper privacy and the need to provide security for individual shipments and for their facilities and personnel in the aggregate. In fact, most small package carriers, particularly the USPS, require a search warrant before packages can be opened by law enforcement officials (Brooks 2000).

Another factor to be considered is that, if security is a responsibility of the shipper, many of the small "dot com's" and other firms using the Internet as a mechanism to reach a global market are unaware of the scope of such an undertaking and/or do not have the financial resources to accomplish the task. If security, of both the package and the contents is the responsibility of the carrier, then the carrier's personnel are converted into some type of unofficial enforcement army which would be an unacceptable situation. Couple this with the incredible number of small packages handled on an hourly basis, and the potential for terrorist penetration is greatly increased.

IMPLICATIONS FOR MANAGERS

The need for supply chains having the greatest potential to operate even in the event of unexpected terrorist activity directed toward the shipper, carrier, customer, or the operating environment is the responsibility of all parties involved. While the specific methods chosen by any individual entity may differ, the objectives must remain the same—to deliver the quality of product and performance that meets customer needs and company objectives. In order to accomplish these objectives, managers must take the initiative and scrutinize existing plans and processes in an effort to identify and strengthen those linkages that are especially vulnerable to terrorist disruption.

Shippers

Over the years, as firms have designed supply chains for competitive advantage and increased efficiencies, the emphasis has been on decreased numbers of suppliers, increased cooperation with suppliers on everything from forecasting to product development, and decreased inventory levels with increased inventory flow at all levels of the supple chain. The ultimate objective is to deliver the greatest level of customer satisfaction in the most efficient and cost effective manner possible. The greatest effort has been focused on the internal processes and procedures needed to facilitate the accomplishment of these goals.

The end result has been supply chains which encircle the globe. Suppliers, customers and manufacturing and storage/distribution facilities have been located to take advantage of reduced costs in manufacturing, transportation, and inventory carrying costs. Increased use of joint purchasing has resulted in reduced costs. All of these individual entities are connected with information technology links from bar coding to track inventory, to Internet ordering, payment, tracking and tracing, to ERP systems intended to coordinate inventory levels and production rates to meet but not exceed customer needs. In order to produce this new "lean, mean" supply chain, in many cases, redundancy has been rooted out of the system.

With the greater global reach and lack of redundancy in the system, new criteria must be included when making supply chain design decisions. New criteria for **vendor selection** must include the ability to operate in the event of terrorist activity, location, and the identity of the carriers and routes used to transport products. Location and safety stock levels are a second area of concern. **Location decisions** must include a consideration of the risk factor involved when locating facilities, serving customers, and/or using vendors who are located in areas subject to a higher probability of terrorist disruption. When making **safety stock decisions**, the likelihood of supply interruption based on vendor location and carrier selection and routes must be considered. The level of interdependency between vendors must be scrutinized. There is an increased vulnerability in the event that supply is disrupted to all the dependent vendors. Therefore, the vulnerability of the common supplier to disruptive activity must be assessed. All of these factors affect the level of safety stock that must be carried.

IT decisions must be made with recognition that an intentional corruption of the system can affect all elements of the supply chain. A criterion for IT system selection, then, should be the ability of the system to resist corruption attempts as well as the ease with which the results of system sabotage can be identified and corrected. As the supply chain becomes more IT dependent, the question becomes whether it is able to operate through an alternative system if necessary.

Carriers

Carriers are faced with their own need to protect their ability to operate in the event of terrorist disruption. Internal considerations might range from supplier selection for items such as tires and fuel to the vulnerability of information and GPS systems. The location and security of terminal facilities is an important consideration for personnel, equipment, and cargo in transit.

The decision as to shipper selection is an important one. Factors which should come under consideration include location of shipper facilities, location of the shipper's customers, and the routes that must be taken to serve these customers. Just as important is the choice of partners in alliances designed to extend geographic coverage and service offerings.

Route decisions involve the choice of port, terminal, and air facilities in addition to the actual road or trackage that might be used. Terrorist activity can and has affected the ability of carriers to make use of such facilities, thus disrupting more than one level in a supply chain and/or multiple supply chains.

CONCLUSIONS

There will always be a question of cost vs. benefit when reassessing and redesigning a supply chain. The primary emphasis during this process is most commonly on cost reduction. However, reducing the immediate and long term effects that can result from terrorist disruptions does not come without costs. Companies pay high insurance costs to protect their executives who are targets of terrorist kidnapping. There are additional costs for body guards, drivers, and bullet proof automobiles. The objective is to protect that managerial expertise and prevent the disruption of operating and strategic activities. Insurance costs for facilities and for inventory stored in more politically unstable locations are substantially higher. How do these costs compare to the costs of "bullet proofing" systems and facilities? How does the cost of the judicious use of built-in redundancy compare to the cost of operational disruption and the inability to deliver the requisite level of customer service?

It is essential that carriers and shippers examine their practice of establishing and/or servicing a global supply chain. The location and operations of suppliers, transportation modes, individual carriers and routes, and storage/distribution facilities must be reexamined with an eye to their vulnerability to terrorist activity. Carriers must examine the coverage, service, and route requirements of their customers. All members of the supply chain must assess their levels of security and their ability to function in the event of terrorist disruption not only at their own level but at any other level of the supply chain.

As a result of increased technology, advanced modes of transportation, instant communication and the development of global enterprises, there is every possibility that the next "business" to suffer a loss of lives and/or economic loss will be yours.

REFERENCES

Allen, Kathleen M. (1991). "The Role of Logistics in the Overseas Plant Selection Decision Process of United States-Based Multinational Corporations," *Journal of Business Logistics,* 12 (2): 59-72.

Ballou, Ronald H.(1990). "A Continued Comparison of Several Popular Algorithms For Vehicle Routing and Scheduling," *Journal of Business Logistics*, 11 (1): 111-126.

Brooks, Rick (2000). "Package Deals," *The Wall Street Journal*, (Thursday, October 12): A1, A14.

Cavinato, Joseph L. (1992). "A Total Cost/Value Model for Supply Chain Competitiveness," *Journal of Business Logistics*, 13 (2): 285-301.

Fabey, Michael (1998). "Lessons in Anti-terrorism," *Traffic WORLD*, 3 (255, July 20): 29.

Foster, Jerry R. and Sandra Strasser (1990). "Carrier/Modal Selection Factor: The Shipper/Carrier Paradox," *Transportation Research Forum*, XXXI (1): 206-212.

Harrington, Thomas C., D. M. Lambert, and M. Christopher (1991). "A Methodology for Measuring Vendor Performance," *Journal of Business Logistics*, 12 (1): 83-104.

Hsu, J. I. and M. K. El-Najdawi (1991). "Integrating Safety Stock and Lot-Sizing Policies for Multi-Stage Inventory Systems Under Uncertainty," *Journal of Business Logistics*, 12 (2): 221-238.

Min, Hokey and William Galle (1996). "An Examination of International Logistics Practices of U.S. Logistics Professionals," *Journal of Transportation Management*, 8 (Fall): 43-57.

Morgan, Ivor P. and Peter M. Arnold (1990). "International Logistics Management," *Journal of Business Logistics*, 11 (1): 140-158.

Patterns of Global Terrorism 1999 (2000). United States Department of State, Office of the Secretary of State, Office of the Coordinator for Counterterrorism, (April): viii.

Pope, Hugh (2000). "Anti-U.S. Fervor Hits Mideast, but So Far, Business Is Spared," *The Wall Street Journal*, (Thursday, October 19): A22.

Tallon, William J. (1993). "The Impact of Inventory Centralization on Aggregate Safety Stock: The Variable Supply Lead Time Case," *Journal of Business Logistics*, 14 (1): 185-203.

AUTHOR BIOGRAPHY

Kathryn Dobie, Ph.D. is currently an associate professor of transportation and logistics at North Carolina A&T State University. She has previously held positions at the University of Arkansas and University of Wisconsin–Eau Claire. She received her Ph.D. from the University of Memphis in 1992. Her articles have appeared in the *Transportation Journal*, *Journal of Transportation Management*, *Journal of Transportation Law, Logistics and Policy* and numerous other marketing and transportation/logistics oriented journals. Current research interests are focused on non-controllable external influences on the functioning of the supply chain.

AUTHOR BIOGRAPHY

L. Milton Glisson, professor of marketing and transportation, currently holds the position of chair of the Business Administration Department at North Carolina A&T State University. He received his Ph.D. in marketing and an MBA in transportation from The American University in Washington, DC, his BS and MA in business education are from East Carolina University in Greenville, NC. In addition to his current position, twenty of his thirty-one years of academic experience have been in the administrative area where he has served as director of the Transportation Institute at The American University, chair of the Department of Business Administration at Averett College, and director of the Transportation Institute at North Carolina A&T State University. He has numerous publications in *The International Journal of Physical Distribution and Logistics Management*, *Transportation Quarterly*, *The Journal of Transportation Management*, *Transportation Practitioners Journal*, *Waterways and Transportation Review*, *The CPA Journal*, *Journal of Public Transportation* and *Journal of Transportation Law, Logistics and Policy* among others. His funded research includes two recently completed projects; one on the planning and budgeting practices of rapid rail transit systems, and another on the capital replacement policies and practices of transit systems in Mexico, Canada and the United States. Dr. Glisson was an invited visiting professor at The International University in Vienna, Austria, where he taught two upper level marketing courses during the July Summer Term of 1998.

AUTHOR BIOGRAPHY

James Grant is currently a professor of marketing at the American University at Sharjah. He received his BS and MBA from Northern Illinois University, and his DBA from Mississippi State University in 1978. Previously, he has been a member of the faculty of Troy State University, the University of South Alabama, and the University of the Virgin Islands. In addition, he has taught seminars to corporate executives in Europe, Asia, Africa, and the Mediterranean. Dr. Grant has published extensively in marketing journals including the *Journal of Hospital Marketing*, the *Journal of Business Ethics*, and the *Journal of Services Marketing*.

Journal of Transportation Management

Guidelines for Submission/Publication

FRONT MATTER

1. First Page—Title of the paper, name and position of the author(s), author(s) complete address(es) and telephone number(s), e-mail address(es), and any acknowledgment of assistance.

2. Second Page—A brief biographical sketch of each author including name, degree(s) held, title or position, organization or institution, previous publications and research interests.

3. Third Page—Title of the paper without author name(s) and a brief abstract of no more than 100 words summarizing the article. The abstract is used on the Contents page of the JTM and serves to generate reader interest in the full article.

FORMATTING

1. Manuscripts should be typed, double-spaced (body of text only), on white 8 ½ by 11 inch paper.

2. Submit four (4) paper copies of the manuscript for review. It is not necessary to send a disk for the initial review. However, to save time and effort if accepted, the article should be prepared using either:

   WordPerfect ***9.0 or lower***
   OR
   Microsoft Word ***95 or lower***

3. Accepted articles, in final form, are to be submitted on disk (in WordPerfect or Microsoft Word format as described above) and in hard copy. Note: Macintosh versions of WordPerfect and Microsoft Word are NOT acceptable.

4. The entire manuscript should have 1" margins on all sides in Times 10-point font. Times New Roman or Century Schoolbook are both acceptable.

5. The entire manuscript must be typed LEFT-JUSTIFIED, with the exception of tables and figures.

TITLE PAGE AND ABSTRACT

1. The manuscript title should be printed in Times 11-point and in all capital letters and bold print.

2. Author(s) and affiliation(s) are to be printed in upper and lower case letters below the title. Author(s) is(are) to be listed with affiliation(s) only.

3. The abstract should be 100 words or less.

BODY OF MANUSCRIPT

1. Main headings are bolded and in all caps.
2. First level headings are upper/lower case and bolded.
3. Second level headings are upper/lower case.
4. The body is NOT indented, rather a full blank line is left between paragraphs.
5. A full blank line should be left between all headings and paragraphs.
6. Unnecessary hard returns should not be used at the end of each line.

TABLES AND FIGURES

1. ONLY Tables and Figures are to appear in camera-ready format! Each table or figure should be numbered in Arabic style (i.e., Table 1, Table 2).

2. All tables MUST be typed using either WordPerfect table or Microsoft Word table functions. Tables should NOT be tabbed or spaced to align columns. Column headings should not be created as separate tables. Table titles should not be created as part of the table. All tables MUST be either 3 1/4 inches wide or 6 7/8 inches wide.

3. All figures MUST be saved in one of these formats: TIFF, CGM, or WPG.

4. Tables and figures are NOT to be included unless directly referred to in the body of the manuscript.

5. For accepted manuscripts, tables and figures must be included on the submitted disk and each should be printed on a separate page.

6. Placement of tables and figures in the manuscript should be indicated as follows:

Table or Figure About Here

EQUATIONS, CITATIONS, REFERENCES, ETC.

1. Equations are placed on a separate line with a blank line both above and below, and numbered in parentheses, flush right. Examples:

$$y = c + ax + bx \quad (1)$$

$$y = a + 1x + 2x + 3x + ax \quad (2)$$

2. References within the text should include the author's last name and year of publication enclosed in parentheses, e.g. (Cunningham 1993; Rakowski and Southern 1996). For more than one cite in the same location, references should be in chronological order, as above. For more than one cite in the same year, alphabetize by author name, such as (Grimm 1991; Farris 1992; Rakowski 1992; Gibson 1994). If practical, place the citation just ahead of a punctuation mark. If the author's name is used within the text sentence, just place the year of publication in parentheses, e.g., "According to Rakowski and Southern (1996)...,". For multiple authors, use up to three names in the citation. With four or more authors, use the lead author and et al., (Mundy et al. 1994). References from the Internet should contain the date the page/site was created, date page/site was accessed, and complete web address.

3. Footnotes may be used where necessary. Footnotes are in 8-point font and should appear at the bottom of the page using numbers (1, 2, etc.). Note: footnotes should be explanatory in nature if used, not for reference purposes.

4. All references should be in block style. Hanging indents are not to be used.

5. Appendices follow the body of the text but do not precede references.

6. The list of references cited in the manuscript should immediately follow the body of the text in alphabetical order, with the lead author's surname first and the year of publication following all author names. Work by the same author with the same year of publication should be distinguished by lower case letters after the date (e.g., 1996a). For author names that repeat, in the same order, in subsequent cites, substitute a .5 inch underline for each name that repeats. Authors' initials should have a space between the initials, e.g., Smith, H. E., Jr., Timon, P. S. R., III, etc. A blank line should separate each reference in the list. Do not number references.

7. All references to journals, books, etc. are *italicized*, NOT underlined. Examples are as follows:

Journal Article:

Collison, Fredrick M. (1994), "Transpacific Air Service with Hong Kong: Characteristics and Issues," *Journal of Transportation Management*, 6(2):1-39.

Book Chapter:

Hatch, R. W. (1923), "A Program for the Social Studies in the Junior and Senior High Schools," In G. M. Whipple (Ed.), *National Society for the Study of Education Yearbook 1922* (Pt. 2, pp. 126-154) Bloomington, IL: Public School Publishing.

Book:

Johnson, James C. & Donald F. Wood (1996), *Contemporary Logistics*, 6th ed., Upper Saddle River, NJ: Prentice-Hall, Inc.

Internet Reference:

Lankard, B. A. (1995), "Service Learning," *Eric Trends and Issues Alerts*, [Online]. Available: http://ericave.org/docs/service.thm. Accessed: 3/2/00.

MANUSCRIPT SAMPLE

TEACHING LOGISTICS STUDENTS TO TAKE OWNERSHIP OF INFORMATION INFRASTRUCTURE DEVELOPMENT

Frank W. Davis, University of Tennessee
Kenneth J. Preissler, Logistics Insights Corporation

Logistics systems, developed gradually over the past decades, are undergoing necessary radical change in this era of increasing global competition. This article describes an approach taken by the authors to teach logistics students how to take ownership of designing their own information infrastructure and how to use it to make their organizations more flexible, providing more strategic options.

INTRODUCTION

Advances in information systems technology such as data base management systems, bar code scanning, telecommunications, and image processing have enabled logistics and information managers with vision to reengineer the way the firm conducts its business. The usage of mainframe computers, personal computers, and logistics information systems has been widely studied (Gustin 1989). These studies have universally concluded that there has been a rapid growth in the usage of computers and logistics information systems.

Computer Usage in the Classroom

The usage of computer applications in a logistics course has also been studied. Rao, Stenger and Wu stated that there are several approaches to integrating computers into the classroom in a business curriculum, each with its individual advantages and drawbacks (1992).

Table 1 about here

Systems Development In Practice

The study of the information systems development process of computer applications has been almost universally left up to the computer science, software engineering, and information systems educators and practitioners.

$$y = a + 1x + ax \qquad (1)$$

REFERENCES

Collison, Fredrick M. (1994), "Transpacific Air Service with Hong Kong: Characteristics and Issues," *Journal of Transportation Management*, 6(2):1-39.

Crum, M. R. (1996), "On the Improvement of Carrier EDI Implementation Strategies," in *EDI Implementation in the Transportation Industry*, New York: Transportation Press, 387-404.

Johnson, James C. & Donald F. Wood (1996), *Contemporary Logistics*, 6th ed., Upper Saddle River, NJ: Prentice-Hall, Inc.


Georgia Southern University
Southern Center for
LIT
Logistics & Intermodal Transportation